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A Next, Big Step for the West: Using Model Legislation to Create a Water-Climate Element in Local Comprehensive Plans

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A NEXT, BIG STEP FOR THE WEST: USING MODEL LEGISLATION TO CREATE A WATER-CLIMATE ELEMENT IN LOCAL COMPREHENSIVE PLANS

Michelle Bryan Mudd*

“Since it touches all we do and experience, water creates a language through which we may discuss our common future.”¹

Abstract: The West is witnessing early, important efforts to join water supply and land use planning, and the reality of climate change makes this convergence all the more critical. Local comprehensive planning presents itself as an existing and indispensable tool for unifying important planning efforts in the areas of land use, water, and climate change. As the primary regulators of land use, local governments are at the front line of regulating a myriad of environmental concerns. They are also integral partners in planning and implementing water-related initiatives alongside tribal, state, federal, and private partners. The West’s potential for broad-based action is greatly increased if water and climate become an essential, required element of local comprehensive planning. This article thus calls for a new, freestanding “water-climate element” in comprehensive planning that better prepares our communities for the important task of managing water in wise, resilient, and collaborative ways.

Part I summarizes the first legal steps being taken to integrate water-land use planning, predominantly through assured supply laws. This first level of integration alone is no small task since it requires a realignment of historically separate legal spheres in which water law is the domain of the state and land use is the domain of the local government. Yet there is more to be done. Part II argues for an expansion of water-land use planning to include climate planning, and discusses the innovative work that some communities are generating in this area. Part III illustrates why model legislation for a “water-climate” element in comprehensive planning is a next, big step to bring land use, water, and climate together. It then describes the key provisions of such model legislation. The

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1. Aaron T. Wolf, *Healing the Enlightenment Rift: Rationality, Spirituality and Shared Waters*, 61 J. INT’L AFF. 51, 69 (2008), available at http://www.transboundarywaters.orst.edu/publications/abst_docs/Wolf-Healing%20the%20Enlightenment%20Rift%2008%20FINAL.pdf.

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article concludes that if western states require local water-climate planning, there will be improved community preparedness and more robust inter-jurisdictional cooperation regarding shared land and water resources. Thus, a water-climate element is a practical and critical part of integrating water, land use, and climate planning in the West.

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INTRODUCTION

There is emerging recognition that water law and land use law are inextricably entwined. After years of viewing these legal fields as separate, the West is now witnessing early efforts to join water and land use through assured supply laws that more strongly demand adequate water availability before

land development is approved.² These efforts have become all the more critical in the face of climate change, which poses profound impacts on local water supply and land use. Land use, in turn, remains one of the primary human drivers of climate change.³ This reality calls for a third planning connection that links water-land use planning with climate action planning.⁴

While this planning need is broadly applicable throughout the United States, it holds particularly true in the West, where population pressures strain over-claimed water supplies that are further imperiled by climate changes.⁵ The U.S. Census Bureau forecasts that western states will experience a nearly forty-six percent population increase between 2000 and 2030, the largest in the nation.⁶ Unlike in the past, the West can no longer rely on massive federal water projects to back-stop increasing water demands.⁷ The West also grapples with the unchecked use of exempt wells that fuel housing development without undergoing water rights review—“water

2. See discussion *infra* Part I.A.

3. After carbon emissions from fossil fuel use, land use is a smaller but “significant” driver of climate change. Intergovernmental Panel on Climate Change, CLIMATE CHANGE 2007: SYNTHESIS REPORT 37 (Nov. 2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

4. The EPA defines a climate change action plan as one that “lays out a strategy, including specific policy recommendations, that a state will use to address climate change and reduce its greenhouse gas emissions.” *Climate Change Action Plans*, U.S. ENVTL. PROT. AGENCY, <http://epa.gov/statelocalclimate/state/state-examples/action-plans.html> (last visited June 12, 2013). Presently, thirty-two states have developed a climate action plan. *Id.* Dan Tarlock is among the earlier advocates of this linkage. A. Dan Tarlock, *Western Water Law, Global Warming, and Growth Limitations*, 24 LOY. L.A. L. REV. 979 (1991).

5. See generally A. Dan Tarlock & Sarah B. Van de Wetering, *Growth Management and Western Water Law: From Urban Oases to Archipelagos*, 5 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 163 (1999) [hereinafter *Growth Management and Western Water Law*] (observing that the West is experiencing the highest rates of population growth, the highest per capita daily water consumption, and a limited ability to develop new water sources); see also discussion *infra* Part II.

6. *Interim State Population Projections*, Table 6: Total Population for Regions, Divisions, and States: 2000 to 2030, U.S. CENSUS BUREAU (Apr. 2005), <http://www.census.gov/population/projections/data/state/projectionsagesex.html>. This figure is significantly higher than the national average of twenty-nine percent. *Id.*

7. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 168 (“In the foreseeable future, much less of the necessary water [in the West] will come from new large-scale water storage projects . . . There is little evidence in an era of fiscal restraint, environmental protection and balanced budgets, that the federal government will embark on another round of inefficient state capitalism . . .”).

management's Achilles' heel."⁸ And aside from the sheer practical necessity of providing people with adequate water, there are numerous legal drivers of water-land use-climate integration. Among them are Endangered Species Act (ESA) protections for aquatic species in climate-stressed waters, federal mandates and incentives for addressing climate change during water project planning, and tribes exerting more control over shared waters through their aboriginal and reserved water rights.

Early efforts in assured supply regulation, while important, are not designed to address the full ambit of these issues. They are often limited to specific large-development proposals, specific water supply sources, or specific urbanized areas.⁹ Standing alone, these laws will not "ensure the broader and deeper coordination between water and land use planning needed today."¹⁰ For this reason, commentators have noted the need to "merge assured supply laws into larger legislative and planning proposals" to better achieve sustainability for communities.¹¹

Local comprehensive planning is an existing and indispensable tool for unifying these important planning efforts. As the primary regulators of land use, local governments are at the front line of regulating a myriad of environmental concerns that federal and state laws do not

8. Cally Carswell, *Death by a Thousand Wells*, HIGH COUNTRY NEWS (Oct. 26, 2009), available at <http://www.hcn.org/issues/41.18/death-by-a-thousand-wells> (discussing exempt well abuse in Washington's Yakima River watershed). Exempt wells, which are prevalent throughout the West, involve groundwater withdrawals exempt from standard state law requirements for water use. Importantly, the wells can be developed without an advance analysis of water availability. *E.g.*, MONT. CODE ANN. § 85-2-306(3) (2011) (up to thirty-five gallons per minute or ten acre-feet per year); WASH. REV. CODE § 90.44.050 (2012) (5000 gallons per day or 5.60 acre-feet per year). For a summary of the various state exempt well laws, see Jesse J. Richardson, *Existing Regulation of Exempt Wells in the United States*, 148 J. CONTEMP. WATER RES. & EDUC. 3-9 (2012).

9. See discussion *infra* Part I.A.

10. Lincoln L. Davies, *Just a Big, "Hot Fuss"? Assessing the Value of Connecting Suburban Sprawl, Land Use, and Water Rights Through Assured Supply Laws*, 34 ECOLOGY L.Q. 1217, 1292 (2007) [hereinafter Davies, *Assessing the Value of Assured Supply Laws*].

11. Lincoln L. Davies, Symposium, *Assured Water Supply Laws in the Sustainability Context*, 4 GOLDEN GATE UNIV. ENVTL. L. J. 167, 197 (2010) [hereinafter Davies, *Assured Water Supply Laws in the Sustainability Context*].

reach.¹² And while local governments are not the principal regulators of water, they are integral partners in planning and implementing water-related initiatives alongside tribal, state, federal, and private partners.¹³ Comprised of approximately 4700 local government units and 2700 natural resource special districts,¹⁴ the West's potential for broad-based action is greatly increased if water-climate planning becomes a required element of local comprehensive planning. Unfortunately, current comprehensive planning statutes do not reflect today's water and climate realities. These enabling statutes typically lump water under broader elements such as infrastructure or natural resources, and generally do not require climate planning at all.¹⁵

This article thus calls for a new, freestanding "water-climate element" in comprehensive planning that better prepares communities for the important task of managing water in wise, resilient, and collaborative ways. Model enabling legislation can facilitate the widespread use of this new element by providing states with a uniform template for adoption. The Land Use Clinic at the University of Montana School of Law is

12. For an extensive discussion of the advent of local environmental law, see generally John R. Nolon, *In Praise of Parochialism: The Advent of Local Environmental Law*, 26 HARV. ENVTL. L. REV. 365 (2002), reprinted in *The Intersection of Environmental and Land Use Law*, 23 PACE ENVTL. L. REV. 821 (2006). For additional articles discussing the vital role of local government in environmental protection see, for example, Michelle Bryan Mudd, *A "Constant and Difficult Task": Making Local Land Use Decisions in States with a Constitutional Right to a Healthful Environment*, 38 ECOLOGY L. Q. 1 (2012); Pamela Corrie, Comment, *An Assessment of the Role of Local Government in Environmental Regulation*, 5 UCLA J. ENVTL. L. & POL'Y 145, 145–48 (1986); Nestor M. Davidson, *Cooperative Localism: Federal-Local Collaboration in an Era of State Sovereignty*, 93 VA. L. REV. 959, 972–73 & n.47 (2007); A. Dan Tarlock, *The Potential Role of Local Governments in Watershed Management*, 20 PACE ENVTL. L. REV. 149, 156–61 (2002) [hereinafter Tarlock, *Local Governments in Watershed Management*].

13. *E.g.*, generally Craig Anthony (Tony) Arnold, *Clean-Water Land Use: Connecting Scale and Function*, 23 PACE ENVTL. L. REV. 291 (2006); Tarlock, *Local Governments in Watershed Management*, *supra* note 12.

14. STATISTICAL ABSTRACTS OF THE UNITED STATES: 2012, STATE AND LOCAL GOVERNMENT FINANCES AND EMPLOYMENT, TABLE 429, NUMBER OF LOCAL GOVERNMENTS BY TYPE—STATES: 2007, U.S. CENSUS BUREAU (2007), http://www.census.gov/compendia/statab/cats/state_local_govt_finances_employment.html (last visited June 12, 2013). This figure includes census regions classified as the Mountain West and Pacific West, but does not include Central West states. These regions are described in *Interim State Population Projections*, *supra* note 6.

15. See discussion *infra* Parts I.A and III.A.

currently drafting the text for this model legislation, including annotated comments and guidance for legislative bodies.¹⁶

Part I of this article summarizes the first legal steps being taken in the area of water-land use planning, predominantly through assured supply laws. This first level of integration alone is no small task since it requires a realignment of historically separate legal spheres in which water law is the domain of the state and land use is the domain of the local government. Part II then argues for an expanded linkage to climate planning, and discusses the innovative work that King County, Washington has done in this area. Part III illustrates why model legislation for a water-climate element in comprehensive planning is a next important step in advancing the West's response to the climate change and describes the key provisions of such model legislation. These key provisions are informed by best practices in the fields of water, land use, and climate planning, along with recent, on-the-ground examples such as those in Washington's Yakima River Basin, Walla Walla River Basin, and Tri-Cities region.

If western states require local water-climate planning, there will be improved community preparedness and more robust inter-jurisdictional cooperation regarding shared water resources. Model legislation can also foster a level of uniformity among local responses to water-climate issues, while still affording flexibility to tailor planning to the unique water needs of each region. Thus, a water-climate element is a practical and critical part of integrating water, land use, and climate planning in the West.

I. THE CONVERGENCE OF WATER SUPPLY AND LAND USE: GOOD FIRST STEPS, BUT STILL A GREAT DISTANCE TO GO

A decade ago, land use and water law scholars produced an important compilation of writings addressing the provocative question, "Wet Growth: Should Water Law Control Land Use?"¹⁷ During this time, the media also shined its spotlight on

16. The Clinic will make the text of this model legislation available online at <http://www.umt.edu/law/students/clinics/inhouseclin/landuse.php> during the 2013–2014 academic year.

17. Env'tl. Law Inst., WET GROWTH: SHOULD WATER LAW CONTROL LAND USE?

water supply and land development in the West. A New York Times Magazine cover portrayed a fishing boat marooned on the cracked floor of a dry Nevada reservoir and asked, “The Perfect Drought: Will Population and Climate Change Leave the West Without Water?”¹⁸ The emerging response has been a call for local governments to account for water when planning for growth. Tony Arnold, for example, has argued that “Our problem is that we make decisions about using land without evaluating, modifying, or limiting our land uses so as to minimize, mitigate, or avoid harms to water and water-related ecosystems.”¹⁹ Dan Tarlock and Lora Lucero have similarly called for “bridging the pervasive disconnects” between water supply and land consumption.²⁰

Among the challenges of linking water and land use are “problems of fragmentation.”²¹ *Legal fragmentation* exists because water quality regulation is largely federal, water quantity regulation is largely state, and land use planning is largely local.²² The presence of tribal interests adds yet another regulatory regime. Additionally, *expertise fragmentation* occurs because land use and water law have

(Craig Anthony (Tony) Arnold ed., 2005) [hereinafter WET GROWTH]. The book was based on presentations made at a conference by the same name, co-hosted by Chapman University School of Law’s Center for Land Resources and the Environmental Law Institute, at Chapman University on February 7, 2003. Although not updated, the book also contains a helpful “Partial Bibliography of Law Journal Articles Addressing the Integration of Land and Water Resources.” *Id.* at 485.

18. Jon Gertner, *The Future is Drying Up*, N.Y. TIMES MAG. 68 (Oct. 21, 2007), article available at <http://www.nytimes.com/2007/10/21/magazine/21water-t.html>.

19. Craig Anthony (Tony) Arnold, *Introduction: Integrating Water Controls and Land Use Controls: New Ideas and Old Obstacle*, WET GROWTH, *supra* note 17, at 31; see also A. DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES § 5:54 (West 2013) (“Another form of public interest review is emerging as states link water availability to urban growth.”).

20. A. Dan Tarlock & Lora A. Lucero, *Connecting Land, Water, and Growth*, 34 URB. LAW. 971, 972 (2002). Sarah Bates has likewise written extensively in this area. See generally Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5 (with Tarlock); SARAH BATES, CTR. FOR NATURAL RES. & ENVTL. POL’Y, BRIDGING THE GOVERNANCE GAP: STRATEGIES TO INTEGRATE WATER AND LAND USE PLANNING (2011), http://cnrep.org/documents/montana_policy_reports/26910-Public-Policy-Water-Land-Use-Report-2011.pdf.

21. Arnold, *Introduction*, WET GROWTH, *supra* note 17, at 34.

22. *Id.* at 34–37 (Arnold terms this “vertical fragmentation”); see also Tarlock & Lucero, *supra* note 20, at 974 (“vertical disconnects”). While water supply planning tends to focus on water quantity, water quality is important as well since it inevitably impacts available supply.

different expert cultures and conceptual frameworks.²³ Under the West's prior appropriation system, for example, state-authorized dewatering of streams and long-distance transport of water are well-engrained practices that can run counter to a local community's vision for its watershed. Finally, *spatial fragmentation* occurs when water resources span multiple jurisdictions and fall within a myriad of public and private ownership patterns. As observed in Part II below, climate planning introduces further complication since all government levels are implicated in addressing climate change as well.

Lucero notes several risks of ignoring these critical land and water linkages: development decisions made without balancing water supply and demand; loss of rural farmland, wildlife habitat, and cultural traditions; and lack of community control over water allocation.²⁴ In contrast, making this linkage means community concerns are addressed; development is appropriately related to water availability; there is increased predictability, certainty, and efficiency in the development review process; and decisions are part of a long-term vision, representing a comprehensive approach that has balanced competing public interests.²⁵

A number of large-scale, systemic solutions have been offered for this fragmentation, including ambitious restructuring of western governments around watersheds,²⁶ transferring some water permitting decisions to local governments,²⁷ designing regional watershed agencies that

23. *Id.* (Arnold terms this "horizontal fragmentation."); see also Tarlock & Lucero, *supra* note 20, at 974 ("horizontal disconnects").

24. Lora A. Lucero, *Comments: Connecting Water and Land—The Challenge of Implementation*, WET GROWTH, *supra* note 17, at 445–47 (citing conclusions of a New Mexico working group on land and water).

25. *Id.* at 448–49.

26. See generally Tarlock, *Local Governments in Watershed Management*, *supra* note 12; Janet C. Neuman, *Dusting Off the Blueprint for a Dryland Democracy: Incorporating Watershed Integrity and Water Availability Into Land Use Decisions*, WET GROWTH, *supra* note 17, at 119 (drawing upon John Wesley Powell's original vision of governmental units organized along watershed boundaries); J.B. Ruhl et. al., *Proposal for a Model State Watershed Management Act*, 33 ENVTL. L. 929, 929–30, 945–46 (2003) (proposing a "multi-tiered governance system linking state, regional, and local units of government through careful distribution of planning responsibilities and policy implementation authorities").

27. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 183–85 (discussing expanded local government standing in water permitting decisions as well as area-of-origin permitting powers for local governments).

direct local water planning efforts,²⁸ and moving waterfront property into common public ownership.²⁹ Appropriate as these long-term solutions may be, some may prove difficult to achieve on a time scale that is responsive to the pressing water and climate needs of our day. As Tarlock has remarked, such integrated decision-making remains a “turbid vision, rather than a structural reality.”³⁰ Comprehensive planning, on the other hand, offers an existing local government tool for addressing water-climate issues in the short term, while these larger, transformative approaches remain under discussion.

In the meantime, various forms of assured supply laws have already gained traction in the West. These laws, which tend to focus on the largest land developments in the most water-starved places, are an important starting place for analyzing strategies that will make a broader, model water-climate element successful. Accordingly, assured supply legislation and related case law are briefly examined next.

A. *Legislatively Driven Integration Through Assured Supply Laws*

Many western states have begun responding to calls for better water-land use connections. After a series of droughts and ill-advised developments, California pioneered a handful of important laws that connect land use and water supply at different points in the development review process. In 2001, passage of Senate Bill (SB) 610 required large development projects to provide a water supply assessment as part of environmental review under the California Environmental Quality Act (CEQA).³¹ These assessments must consider water

28. See generally Arnold, *Clean-Water Land Use: Connecting Scale and Function*, *supra* note 13.

29. See generally Robert W. Adler, *The Law at the Water's Edge: Limits to "Ownership" of Aquatic Ecosystems*, WET GROWTH, *supra* note 17, at 201 (arguing that property law imposes artificial boundaries on aquatic ecosystems and proposing that aquatic ecosystems should not be owned but should rather be placed under government guardianship).

30. Tarlock, *Local Governments in Watershed Management*, *supra* note 12, at 152.

31. 2001 Cal. Stat. 643 (codified in relevant part at CAL. WATER CODE §§ 10910–12 (West 2012)) (applying to residential developments having more than 500 units and also to large shopping centers, offices, commercial, hotel, industrial, and mixed-use buildings based on square footage and number of employees). The original version of this law dates to 1995, 1995 Cal. Stat. 881, but California made the law more rigorous

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availability during normal, dry, and multi-dry years over a projected twenty-year period.³² When water supply is inadequate, the developer must prepare a plan for acquiring water, including the necessary financial and regulatory steps.³³ Also in 2001, passage of SB 221 required local governments to obtain written verification that large residential developments will have adequate water supply for at least twenty years.³⁴ This style of law is termed an “assured supply” law—one that requires developers to “prove they have secured adequate water stock before commencing construction.”³⁵

California’s Urban Water Management Planning Act plays an integral supporting role in assured supply.³⁶ This law requires large urban water utilities to develop long-term, regularly updated water supply plans for their service areas. Local governments can in turn use these supply plans when analyzing water availability under SB 610 and SB 221.³⁷ Although this legal approach is “beginning to bear fruit,”³⁸ several weaknesses result from relying on decentralized water supply planning by utilities: an overall lack of coordination and comprehensive planning among suppliers that share common water sources, data inconsistencies and gaps, overly optimistic assumptions of availability and reliability, and competing claims to the same water sources.³⁹ California also has a history of weak oversight over utility compliance, relying largely on citizen enforcement.⁴⁰ Commentators thus call for

in 2001 in response to concerns that local governments were not enforcing the 1995 law. TARLOCK, *supra* note 19, § 5:54.

32. CAL. WATER CODE § 10910(b)(3) (West 2012).

33. *Id.* § 10911(a).

34. 2001 Cal. Stat. 642 (codified as amended in relevant part at CAL. GOV’T CODE § 66473.7 (West 2012)) (applying to residential developments with 500 or more units).

35. Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1217.

36. CAL. WATER CODE §§ 10610–56 (West 2012) (applying to utilities serving 3000 or more retail connections or supplying at least 3000 acre-feet of water per year).

37. Ellen Hanak, Symposium, *Show Me the Water Plan: Urban Water Management Plans and California’s Water Supply Adequacy Laws*, 4 GOLDEN GATE UNIV. ENVTL. L. J. 69, 70–72 (2010).

38. *Id.* at 85 (noting “fuller descriptions of groundwater sources” and “somewhat more diversified” supply projections that factor in water transfers, recycling, and desalination options).

39. *Id.* at 75–78, 85–89.

40. *Id.* at 71.

stronger state enforcement, along with regulatory and financial incentives, “to encourage water utilities to coordinate . . . within the same groundwater basin and watershed, in accounting for supply sources.”⁴¹

California’s leadership on this issue has been widely noted, most recently at a Golden Gate University School of Law symposium celebrating the tenth anniversary of SB 610 and SB 221.⁴² Yet even with these laws in place, California is far from addressing what its water resource managers have termed “an assortment of crises, in varying stages of dysfunction.”⁴³ They call for even better integration of “water management with common sense land use decisions for the benefit of water supply reliability, water quality, and ecosystem health and stability.”⁴⁴ Because California’s assured supply laws target the largest developments, the vast majority of projects—over eighty-five percent—are not subject to assured supply review.⁴⁵ And for all its achievements, California does not yet require a water supply element in local comprehensive planning.⁴⁶

Other states’ efforts are also worthy of attention. Nine of the eleven contiguous western states have some form of assured supply law, with great variability among approaches.⁴⁷ To

41. *Id.* at 88.

42. For a compilation of the symposium works, see generally 4 GOLDEN GATE U. ENVTL. L.J. 1 (2010).

43. John T. Andrew et al., *California Water Management: Subject to Change*, 14 HASTING W.N.W. J. ENVTL. L. & POL’Y 1463, 1464 (2008).

44. *Id.* at 1469.

45. Rande Kanouse & Douglas Wallace, Symposium, *Optimizing Land Use and Water Supply Planning: A Path to Sustainability*, 4 GOLDEN GATE U. ENVTL. L.J. 145, 153 (2010) (citing a 2008 California Research Bureau study that applied a more rigorous review threshold of 250-units and concluded that even under that threshold, less than fifteen percent of the total new residential demand would require water availability documentation).

46. See generally Ryan Waterman, Comment, *Addressing California’s Uncertain Water Future by Coordinating Long-Term Land Use and Water Planning: Is a Water Element in the General Plan the Next Step?*, 31 ECOLOGY L.Q. 117, 173–75 (2004) (observing *inter alia* that water supply analysis is not mandatory, and that although water is addressed under other mandatory elements, there is not free-standing water element that considers the resource holistically).

47. Bobbie Klein & Douglas Kenney, *The Land Use Planning Water Resources and Climate Change Connection: Challenges and Opportunities* 2–5 (2009), http://sciencepolicy.colorado.edu/admin/publication_files/resource-2729-2009.15.pdf (noting Idaho and Utah as the exceptions); see also *Water Supply and the Land Use*

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ensure adequate supply in times of drought, Nevada requires water suppliers to “adopt a plan of water conservation based on the climate and the living conditions of its service area.”⁴⁸ During local subdivision review, developers in Arizona generally must prove adequate water supply for a 100-year period, and they face additional state-level review in active groundwater management areas.⁴⁹ Taking a less stringent approach, Montana gives local governments broad discretion to determine what “water availability” means.⁵⁰ Montana also requires a weaker level of proof (pre-existing well logs and data from neighboring properties are sufficient), and does not require availability over a period of years.⁵¹

Two states that address assured supply through comprehensive planning are Oregon and Washington. Oregon, an early pioneer in state-directed planning, mandates in general terms that local government comprehensive plans consider water resources when planning for land development.⁵² Because land development approvals must be consistent with comprehensive plans, a number of local governments require a showing of water availability for new

Connection, W. WATER L. & POL’Y REP. 303-322 (Sept. 2005) (summarizing the land use and water supply laws of several western states).

48. NEV. REV. STAT. ANN. §§ 540.131, .141 (2011).

49. ARIZ. REV. STAT. ANN. § 9-463.01(I) (2013) (municipal subdivisions); *id.* § 11-823 (county subdivisions); *id.* § 45-108(I) (defining “adequate water supply” as “[s]ufficient groundwater, surface water or effluent of adequate quality [to be] continuously available to satisfy the water needs of the proposed use for at least one hundred years” and the financial capability to provide such a supply); *id.* § 45-576(J) (defining “assured supply” similarly for purposes of active groundwater management areas). These groundwater protections responded to congressionally-driven requirements that Arizona cease groundwater mining before it received funding for the Central Arizona Project. A. Dan Tarlock, Symposium, *How California Local Governments Became Both Water Suppliers and Planners*, 4 GOLDEN GATE U. ENVT’L L.J. 7, 21–22 (2010).

50. MONT. CODE ANN. § 76-3-622(e) (2011). New Mexico takes a similar tack, requiring that counties “assess[] water availability to meet the maximum annual water requirements of subdivisions,” but leaving the definition of availability to the counties. N.M. STAT. ANN. § 76-3-622(e) (West 2012).

51. MONT. CODE ANN. § 76-3-622(e). Colorado also gives local governments broad discretion in determining both the types of evidence considered and the level of water supply appropriate “for the type of subdivision proposed.” COLO. REV. STAT. ANN. § 30-28-133(3)(d) (2012). Nevada is more lenient on this front as well: at final plat stage, a state agency merely confirms water availability without reference to a particular period of supply. NEV. REV. STAT. ANN. § 278.377(1)(b) (2011).

52. OR. REV. STAT. §§ 197.015, .175 (2011).

development.⁵³ Nonetheless, Oregon's law speaks in generalities, is "less compulsory in practice than it might initially appear," and is "typified by local differentiation, with requirements ranging from restrictive, explicit rules to general, barely-there measures."⁵⁴

Under the land use element of its comprehensive planning statute, Washington requires local governments to protect groundwater used for public water supplies.⁵⁵ Washington also allows an optional conservation element, which can encompass waters and watersheds, among other natural resource issues.⁵⁶ Further, local governments must designate critical areas that include wetlands, fish and wildlife habitat, and aquifer recharge areas.⁵⁷

Complementing its comprehensive land use planning, Washington has additional laws that influence local water planning. In "critical water supply areas," Washington requires utility water supply plans to be coordinated with local land use plans to ensure adequate water availability.⁵⁸ The state's Watershed Planning Act⁵⁹ also provides state grants that encourage local, state, and tribal governments to write watershed plans protecting both instream flows and land use needs.⁶⁰ As discussed below, the combined effect of Washington's laws has prompted some local governments to engage in meaningful water-land use planning, particularly in areas where water scarcity is most acute.⁶¹ Nonetheless, the absence of a mandatory water-climate element means that Washington local governments are not uniformly engaging in such a process.

Other states have approached assured supply through water

53. Variations in local government approaches in Oregon are discussed in Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1259–61.

54. *Id.* at 1259, 1263; *see also Water Supply and the Land Use Connection*, *supra* note 47, at 321.

55. WASH. REV. CODE § 36.70.330(1) (2012).

56. *Id.* § 36.70.350(1).

57. *Id.* § 36.70A.170; WASH. ADMIN. CODE § 365-195-200(5) (2012) (defining "critical areas").

58. WASH. REV. CODE § 70.116.050 (2012).

59. *Id.* § 90.82.

60. *Id.* §§ 90.82.040, .043.

61. *See discussion infra* Parts II and III.D (discussing King County, Yakima River Basin, and Tri-Cities examples).

permitting laws. In an effort to tamp down on municipal speculation, Idaho passed a law limiting municipalities from holding onto unnecessary water rights beyond the needs documented in their comprehensive plans.⁶² Until 1997, Nevada similarly required its state engineer to consider local master plans when determining the amount of groundwater that a municipality can reserve for future use.⁶³ When these types of determinations reside solely with state water agencies, however, there can be a lack of state-local coordination that excludes local government from the equation.⁶⁴

B. *Judicial Clarification of Assured Supply Requirements*

Not surprisingly, several assured supply laws have been litigated in state courts. California has witnessed the most water-land use litigation. When water diversion projects are proposed to serve development, the courts have held that CEQA requires agencies to consider water conservation as an alternative to diversion.⁶⁵ Additionally, if water sources for a development are uncertain, that uncertainty is a vulnerability that must be disclosed and analyzed under CEQA.⁶⁶ Uncertainties might include water from a project that has not been fully built,⁶⁷ water tied up in litigation,⁶⁸ water based on mere “paper water” rather than water with “a likelihood of actually proving available,”⁶⁹ or water potentially subject to

62. IDAHO CODE ANN. § 42-222 (2011) (relying on definitions in §42-202(B)).

63. NEV. REV. STAT. § 533.395(6) (1996).

64. Hanak, *supra* note 37, at 87 (noting how California’s approach recognizes “deep-seated notions that both land use and water supply should be managed at the local level”).

65. Cnty. of Inyo v. City of L.A., 71 Cal. App. 3d 185, 203 (Dist. Ct. App. 1977). A detailed analysis of California’s CEQA-based rulings on water availability is summarized in James Moose, Symposium, *The Relationship Between Water Supply and Land Use Planning: Leading Cases Under the California Environmental Quality Act*, 4 GOLDEN GATE UNIV. ENVTL. L. J. 27 (2010).

66. Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova, 40 Cal. 4th 412, 439–42 (2007).

67. Santa Clarita Org. for Planning the Env’t v. Cnty. of L.A., 106 Cal. App. 4th 715, 721 (2003).

68. Cal. Oak Found. v. City of Santa Clarita, 133 Cal. App. 4th 1219, 1241 (2005).

69. *Id.*; Santa Clarita Org. for Planning the Env’t v. Cnty. of L.A., 157 Cal. App. 4th 149, 159 (2007).

delivery curtailment under the ESA.⁷⁰ Further, in phased development projects, a local government cannot defer the question of water availability until a later phase is considered.⁷¹ Thus, California's assured supply jurisprudence helps clarify the level of information necessary to meaningfully analyze water supply.

In other states, assured supply laws have allowed courts to halt ill-advised development decisions. The Nevada Supreme Court, for example, held that Washoe County could deny subdivision approval when a proposal failed to comply with water restrictions in the county's comprehensive plan.⁷² In Washington, a court invalidated a Kittitas County subdivision regulation that allowed developers to impermissibly "evade compliance with water permitting requirements" by relying on domestic well exemptions.⁷³ There, the court concluded that the county regulations failed to protect groundwater as required by the state's Growth Management Act, and failed to examine whether water was both physically and legally available.⁷⁴

And in Oregon, the Land Use Board of Appeals (LUBA) reversed a special use permit approval when Yamhill County failed to take into account impacts on neighboring groundwater supply.⁷⁵ There, the county comprehensive plan

70. *Pres. Wild Santee v. City of Santee*, 210 Cal. App. 4th 260, 289 (2012). For a helpful short summary of these "paper rights" rulings, see Paul Kibel, *CEQA "Paper Water" After Wild Santee—Evaluation of Court-Imposed ESA Limits on Diversions in EIRs*, CENTER ON URBAN ENVIRONMENTAL LAW BLOG (Feb. 20, 2013), <http://ggucuel.org/ceqa-%e2%80%9cpaper-water%e2%80%9d-after-wild-santee-%e2%94%80-evaluation-of-court-imposed-esa-limits-on-diversions-in-eirs>.

71. *Stanislaus Natural Heritage Project v. Cnty. of Stanislaus*, 48 Cal. App. 4th 182, 206 (1996).

72. *Serpa v. Cnty. of Washoe*, 111 Nev. 1081, 1084, 901 P.2d 690, 692 (1995). For its various land use categories, Washoe County's master plan has specific water quantity requirements per dwelling unit, and water hookup requirements in urban areas. See *generally* Master Plan Categories, WASHOE COUNTY MASTER PLAN: LAND USE AND TRANSPORTATION ELEMENT 46–56 (Sept. 2011).

73. *Kittitas Cnty. v. E. Wash. Growth Mgmt. Hearings Bd.*, 172 Wash. 2d 144, 175–81, 256 P.3d 1193, 1208–10 (2011) (requiring multiple, adjoining subdivision applications to be considered together for purposes of determining whether domestic well exemption applied).

74. *Id.*

75. *Spiro v. Yamhill Cnty.*, 38 Or. LUBA 133 (2000). The proposed use was a 240-person church in a rural residential zone that would use well water for its supply. *Id.* at 134–35.

required that development have adequate water supply.⁷⁶ The county argued that the plan language was merely “aspirational” and approved the development without imposing conditions protecting neighboring wells during peak demand times.⁷⁷ LUBA held that the comprehensive plan’s requirements were binding, remanding with instructions for the county to consider peak demand data and provide protections during times of peak demand.⁷⁸

At the end of the day, assured supply laws are beginning to make a difference in reducing the number of dry developments and in forcing developers to more directly confront water supply when planning projects.⁷⁹ Nonetheless, these laws remain limited in application and focused on the short-term question of finding water for individual development proposals, rather than the larger need for long-term water-climate planning.

Some critics, in fact, have argued that assured supply laws can even increase pressure to seek additional water supply and do not necessarily lead to holistic water-climate planning.⁸⁰ Further, to the extent that states require water utilities to engage in water planning, those plans are generated separately from the community comprehensive planning process. “Urban water suppliers have been able to take the position that their only water-related duty is to acquire the supplies necessary to meet demand.”⁸¹ Ultimately, land use

76. *Id.* at 138 (citing Yamhill County Comprehensive Plan § I.B.1.c, available at http://www.co.yamhill.or.us/plan/planning/ordinance/comp_plan_toc.asp (last visited June 12, 2013)).

77. *Id.* at 136–38.

78. *Id.* at 145; see also *Hancourt v. Marion County*, 33 Or. LUBA 400 (1997) (overturning a subdivision when the county failed to determine adequate water availability). Unfortunately, commentators report that this decision is vastly outnumbered by LUBA decisions upholding developments in situations where local governments failed to conduct rigorous water availability review. Davies cites several examples of local governments assuming availability without property-specific data; on appeal, courts have upheld these decisions under a deferential standard of review. Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1259–62.

79. Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1267–68.

80. *E.g.*, Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 177 (discussing how Arizona assured supply laws “triggered a race to acquire water ranches and other new sources of supply”); Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11.

81. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 173. The well-known water acquisition efforts of Los Angeles and Las Vegas provide

planning must evolve beyond the paradigm of expanding supplies to meet demands,⁸² and into a sustainable, holistic model that considers the long-term health of a community's water resources.⁸³ And importantly, that planning must factor in climate change.

II. A NECESSARY NEXT STEP: MAKING THE CLIMATE CONNECTION

"Climate change is water change."⁸⁴ Indeed, water resource administrators identify "planning for and adapting to the uncertainty that climate change brings" as the most significant water challenge of this century.⁸⁵ "Climate change alters the hydrological cycle, changing the background conditions in which natural and man-made systems function."⁸⁶ Warming temperatures and changing precipitation patterns are affecting the quantity, timing, and quality of water supply on which communities depend. The Intergovernmental Panel on Climate Change has observed that "[c]limate change is expected to exacerbate current stresses on water resources from population growth and economic and land-use change, including urbanisation."⁸⁷ And the U.S. Environmental Protection Agency (EPA) lists "protecting America's waters" as the second goal in its draft Climate Change Adaptation Plan.⁸⁸ Local land use planning figures centrally into this goal:

prime examples.

82. See, e.g., Hanak, *supra* note 37, at 73 (arguing for greater demand management through conservation measures).

83. See generally Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11.

84. Brad Udall, Director of the Getches-Wilkinson Center for Natural Resources, Energy, and the Environment, University of Colorado School of Law, Address at the Sixteenth Institute for Natural Resources Law Teachers (May 31, 2013).

85. Andrew et al., *supra* note 43, at 1463. Although the authors were speaking about resources in their home state, the observation holds true for the West at large.

86. U.S. ENVTL. PROT. AGENCY, DRAFT CLIMATE CHANGE ADAPTATION PLAN 16 (June 2012), <http://epa.gov/climatechange/pdfs/EPA-climate-change-adaptation-plan-final-for-public-comment-2-7-13.pdf> [hereinafter EPA DRAFT ADAPTATION PLAN].

87. CLIMATE CHANGE 2007: SYNTHESIS REPORT, *supra* note 3, at 49; see also generally NATIONAL CLIMATE ASSESSMENT DEVELOPMENT ADVISORY COMMITTEE, DRAFT CLIMATE ASSESSMENT REPORT (2013), available at <http://ncadac.globalchange.gov/>.

88. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 12. The first goal is "taking action on climate change and improving air quality." *Id.*

While there is relatively high confidence in our ability to project temperature increases due to climate change, projected changes in precipitation and its effects on hydrology at the local scale are less certain. Therefore, a key challenge will be how to *help local decision makers understand potential local impacts, and how to make long-term plans under a new range of uncertainty about future hydrologic conditions*. Water resource managers will also need to consider the local impacts of climate change as they grapple with other challenges—including *population growth, land use changes*, economic constraints, and a variety of stressors to the quality and quantity of our nations waters.⁸⁹

Patricia Salkin has remarked that when it comes to climate change response, “local governments may be the most important players.”⁹⁰ Robin Kundis Craig also advises that “many adaptation strategies will have to be intensely local in implementation.”⁹¹ Others echo the significance of local collaboration with state and federal actors, calling for integrated strategies that “improve resiliency, reduce residual risk, and increase sustainability.”⁹²

In the West, the need for local action is amplified by the inverse correlation between population growth and water supply. Reduced mountain snow pack, earlier spring runoff, intensified drought, and dewatered rivers in late summer have become a reality for growing western communities.⁹³ In a striking example, snowpack in the Sierra Nevada Mountains is forecasted to decline by at least twenty-five percent this century, “posing a significant threat to California’s water

89. *Id.* at 17 (emphasis added).

90. Patricia E. Salkin, *Sustainability and Land Use Planning: Greening State and Local Land Use Plans and Regulations to Address Climate Change Challenges and Preserve Resources for Future Generations*, 34 WM. & MARY ENVTL. L. & POL’Y REV. 121, 147 (2009).

91. Robin Kundis Craig, “Stationarity is Dead”—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 20-21 (2010) (discussing the distinction between mitigation and adaptation, and arguing the importance of adaptation planning).

92. Andrew et al., *supra* note 43, at 1468.

93. CLIMATE CHANGE 2007: SYNTHESIS REPORT, *supra* note 3, at 49; *see also generally* Ch. 3—Water Resources, DRAFT CLIMATE ASSESSMENT REPORT, *supra* note 87.

supply reliability.”⁹⁴ The over-appropriated Colorado River, on which so many communities depend, is also predicted to see up to a twenty percent drop in flows.⁹⁵ Similar stories exist throughout the West. Since most western rivers are already tapped for a multitude of off-stream uses, this additional hit to instream flows means yet greater damage to aquatic ecosystems, along with harms to the economic, recreational, and cultural health of our communities.⁹⁶

There are several other, less discussed impacts affecting water supply, including increased evapotranspiration rates that necessitate more crop irrigation, additional cold water reservoir releases to address fish distress, increased quantity demands to dilute contaminants during summer low flows, and increased demands to combat wildfires.⁹⁷ On the flip side, increased precipitation and peak runoff events will at times release more water than communities can safely manage.⁹⁸ Further, some of the planned climate mitigation steps will be stymied by water constraints. Impacts to hydroelectricity, for example, will be “compounded by anticipated increases in energy use due to higher temperatures and greater water demands.”⁹⁹ And while commentators have predicted that agricultural water rights will be reallocated to address increased urban water use,¹⁰⁰ the emerging emphasis on local food production signals an ever greater need for retained agricultural water.¹⁰¹

94. Andrew et al., *supra* note 43, at 1465.

95. Rajagopalan, B., et al., *Water Supply Risk on the Colorado River: Can Management Mitigate?*, 45 WATER RESOURCES RES. 2–5 (2009), available at <http://onlinelibrary.wiley.com/doi/10.1029/2008WR007652/pdf> (“The confluence of three factors, increasing delivery obligations anticipated because of population growth, the likelihood of multiyear droughts, and potential flow reductions due to climate change, poses an increasing threat to the . . . Colorado River system . . .”).

96. Arlene J. Kwasniak, *Water Scarcity and Aquatic Sustainability: Moving Beyond Policy Limitations*, 13 U. DENV. WATER L. REV. 321, 323 (2010).

97. Andrew et al., *supra* note 43, at 1467.

98. *Id.* at 1465–66 (noting that flood protection is based on historic 100-year flood event data which does not reflect today’s increased risks of flood frequency).

99. *Id.* at 1466–67.

100. *E.g.*, Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 168–69 (“[I]n the long run, irrigated agriculture will be able to claim a proportionately smaller share of the region’s resources and the released increment will be split between urban use and environmental protection.”).

101. The local food movement is itself linked to climate change response, advocating

Ultimately, climate data calls into question historic assumptions about water availability,¹⁰² signaling that our water rights system and the land uses developed around it are especially vulnerable. The West must thus confront the reality that existing water uses, growing population needs, and ecosystems protection cannot all be accommodated under the status quo. Without integrated water-climate-land use planning, communities will continue to develop beyond the capacity of the landscapes and resources that support them.

By this time, one would expect water-climate planning to feature more prominently in state comprehensive planning statutes, much like topics such as fire and emergency response, transportation, and housing. But that is not the case. Even in the few states that have mentioned climate change in their local planning statutes, the focus has been on climate mitigation through emissions reductions and energy conservation,¹⁰³ with little or no mention of water supply adaptation. To the extent climate-driven water conservation is mentioned in comprehensive planning, it is generally limited to the context of green building design.¹⁰⁴

Planning trends suggest that “[i]ncreasingly, with or without guidance from state enabling acts, local comprehensive plans are attempting to respond to the threats of climate change.”¹⁰⁵ Yet here again, the focus has been on emissions reductions and energy conservation. For example,

for increased community food security and decreased transportation emissions. Jason J. Czarnecki, *Food, Law & The Environment: Informational and Structural Changes for a Sustainable Food System*, 31 UTAH ENVTL. L. REV. 263 (2011); see also generally American Planning Association, *Planning for Food Access and Community-Based Food Systems: A National Scan and Evaluation of Local Comprehensive and Sustainability Plans* (2010), <http://www.planning.org/research/foodaccess/pdf/foodaccessreport.pdf> (citing climate change as a driver for secure, community-based food systems).

102. Andrew et al., *supra* note 43, at 1465; see also Craig Anthony (Tony) Arnold, *Adaptive Watershed Planning and Climate Change*, 5 ENVTL. & ENERGY L. & POL’Y J. 417, 417 (2010) (noting that “climate change will upset settled expectations and require water institutions to adapt.”) [hereinafter Arnold, *Adaptive Watershed Planning*]; Craig, *supra* note 92, at 31 (“[O]bjectives based on the pre-climate change characteristics of particular places can and will become increasingly obsolete.”).

103. Salkin, *supra* note 90, at 126 (citing Arizona, Colorado, and Pennsylvania as examples).

104. *Id.* (citing New Jersey’s green building plan element found at N.J. STAT. ANN. § 40:55D-28).

105. *Id.* at 134.

western cities signing the U.S. Mayors Climate Protection Agreement¹⁰⁶ have addressed water conservation as a limited topic within the category of energy conservation.¹⁰⁷ While climate mitigation is indisputably important, it is equally important for communities to be prepared for monumental changes to their water supply.¹⁰⁸

King County Example. While few instances of integrated local water-climate planning exist, King County, Washington, provides one example of a local climate plan that addresses both mitigation and adaptation.¹⁰⁹ The adaptation section has a strategic focus area for “surface water management, freshwater quality, and water supply.”¹¹⁰ Over the course of several pages, the County goes beyond the typical discussion of water efficiency, setting goals for instream flows, fish and wildlife habitat, flood management, stormwater management, wastewater management, reclaimed water use, inter-agency and regional cooperation, and integration of the climate plan into water supply planning.¹¹¹ The plan also explicitly links land use regulation with protections against water shortage.¹¹²

King County’s climate plan has borne fruit, as evidenced by the extensive discussion of climate change in the 2012 King

106. A copy of the Agreement and related information can be found at <http://www.usmayors.org/climateprotection/agreement.htm> (last visited June 12, 2013).

107. Examples include Colorado Springs, Colorado, and Frisco, Texas, which are discussed in U.S. Conference of Mayors, *TAKING LOCAL ACTION: MAYORS AND CLIMATE PROTECTION BEST PRACTICES 11* (June 2009), <http://www.usmayors.org/pressreleases/uploads/ClimateBestPractices061209.pdf>. Phoenix, Arizona, and Albuquerque, New Mexico are also examples. *CLIMATE PROTECTION: 2008 MAYORS’ CLIMATE PROTECTION AWARD WINNING ENTRIES 22* (2008), <http://www.usmayors.org/climateprotection/documents/08%2012%20Best%20Practices%20D2.pdf>; *CLIMATE PROTECTION STRATEGIES AND BEST PRACTICES GUIDE 2007 MAYORS CLIMATE PROTECTION SUMMIT EDITION 3* (2007), <http://www.usmayors.org/climateprotection/documents/2007bestpractices-mcps.pdf>.

108. Craig, *supra* note 92, at 20-21, 28 (discussing the distinction between mitigation and adaptation, and arguing the importance of adaptation planning).

109. *KING COUNTY 2007 CLIMATE PLAN*, <http://your.kingcounty.gov/exec/news/2007/pdf/climateplan.pdf>. The County has also adopted a 2012 *KING COUNTY STRATEGIC CLIMATE ACTION PLAN*, <http://www.kingcounty.gov/environment/climate/king-county/climate-action-plan.aspx>, which sets short-term performance measures and targets.

110. *KING COUNTY 2007 CLIMATE PLAN*, *supra* note 109, at 121–29.

111. *Id.*

112. *Id.* at 149 (requiring that the plan “identify and evaluate policies that must be updated or changed to prepare for global warming adaptation and mitigation.”).

County Comprehensive Plan Update.¹¹³ Not only is climate change referenced throughout the various elements of the comprehensive plan, it also receives extensive treatment under the plan's "environment" and "services" elements.¹¹⁴ Moving beyond the singular, albeit important, focus of greenhouse gas emissions, and well beyond the mere platitudes found in many comprehensive plans, the comprehensive plan calls for extensive adaptation strategies that include:

- **forest management planning** for resilience, including addressing tree and plant mortality, insect outbreak, low groundwater supply, and forest fire severity and frequency;¹¹⁵
- **soil, nutrient, and water supply management for local agriculture**;¹¹⁶
- **restoration of wetlands and riparian vegetation** in cold water systems to reduce drought and flooding;¹¹⁷
- **improved habitat connection** to facilitate climate-driven species migration, along with protection of habitat areas likely to be resistant to climate change;¹¹⁸
- **reconnecting rivers and their floodplains**;¹¹⁹
- **stormwater runoff management** to promote groundwater recharge and flood control;¹²⁰
- **connecting salmon protection with soil nutrient protection**;¹²¹
- **integrated watershed planning** that links marine and freshwater, flood control, stormwater, surface and groundwater, drinking water, wastewater, fisheries habitat, and reclaimed water planning;¹²²

113. 2012 KING COUNTY COMPREHENSIVE PLAN UPDATE (Dec. 2012), *available at* <http://www.kingcounty.gov/property/permits/codes/growth/CompPlan/2012Adopted.aspx#complete>.

114. *Id.* at 4-14 to 79, 8-12 to -34.

115. *Id.* at 3-43 to -51.

116. *Id.* at 3-63 to -64.

117. *Id.* at 4-27, 4-62 to -66.

118. *Id.* at 4-27, 4-35 to -41.

119. *Id.* at 4-37.

120. *Id.* at 4-51.

121. *Id.* at 4-53 (explaining that salmon die in their original spawning streams, thus returning vital nutrients to the watershed).

122. *Id.* at 4-57 to -58.

- **lake management** to address harmful algal blooms and bacterial contamination due to warming lake temperatures;¹²³
- **protecting critical aquifers**, including recharge areas and sole-source aquifers, to avoid net depletion due to climate change and other causes, incorporating this objective into “land use and water service decisions”;¹²⁴ and
- **monitoring and assessment** that tracks long-term changes in climate, including water quality and quantity data housed in public databases.¹²⁵

The County’s comprehensive plan also calls for regional water planning and conservation, in concert with water utilities, elected officials, the state, and federally recognized tribes,¹²⁶ as well as collaboration with scientists.¹²⁷ To the extent there is room for improvement, the County could take the additional step of restating its various, scattered water-climate goals under a single water-climate element that allows the goals to be considered and implemented holistically. Washington’s existing planning laws, however, do not require this additional step because the statutes simply list water beneath other planning elements.¹²⁸

King County’s plan nonetheless reveals the potential for local governments to address substantive water-climate planning within the context of community planning as a whole. If states explicitly required a water-climate element in local comprehensive plans, the innovations of King County could be replicated throughout the West, meaningfully advancing local water-land use planning in a time of profound climatic change.

123. *Id.* at 4-67.

124. *Id.* at 4-68 to -70.

125. *Id.* at 4-86.

126. *Id.* at 8-17 to -21.

127. *Id.* at 4-26. This complex coordination illustrates that local governments cannot, on their own, fully address the full panoply of water-climate issues affecting their community. Under Washington’s Watershed Planning Act, however, the local government can receive funding to implement such coordinated planning. *See supra* notes 59–60 and related text.

128. *See* discussion *supra* Part I.A.

III. BUILDING MOMENTUM THROUGH MODEL LEGISLATION

Until all communities in the West begin planning within a common framework, population growth, water use, and climate response will continue along fragmented pathways. As Tarlock and Lucero observe, a “clear planning statutory framework” is one of the “most critical steps for mending the disconnects” currently existing in the regulation of land use and water.¹²⁹ Considering that model enabling legislation has historically shaped nationwide land use planning, zoning, and subdivision review, a similar approach makes sense now—an approach that modernizes traditional planning elements to include current water and climate realities.

This final part makes the case for using comprehensive plans to forge critical links between land use, water, and climate. It then explains the key provisions for inclusion in a water-climate element of a comprehensive plan. Innovative community approaches are highlighted throughout, with in-depth Washington case studies appearing under the discussion of inter-jurisdictional coordination of water-climate planning.

A. *Why Comprehensive Planning*

For several reasons, comprehensive planning is uniquely suited to address the water-climate-land use question. *First*, as noted above, existing approaches have not taken us the distance. Despite their benefits, today’s assured supply laws are “relatively narrow tools”¹³⁰ that focus on specific developments and do not directly require long term planning.¹³¹ Lincoln Davies has cautioned:

[We] will do well to remember that assured supply laws are not boundless in reach. It is tempting . . . to declare victory and move on, but assured supply laws will not finish the job themselves. Assured supply laws alone

129. Tarlock & Lucero, *supra* note 20, at 977.

130. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 189.

131. In many respects, the shift beyond assured supply laws and into broader water planning mirrors the historic shift that occurred when local governments moved from relying purely on zoning laws to adding a comprehensive planning component that guides zoning laws.

will not ensure the broader and deeper coordination between water and land use planning needed today.¹³²

Davies continues his critique by noting that these laws also “say nothing about the overall environmental effects of using the water,” such as impacts to endangered species and ecosystems.¹³³ They “gloss over these questions because they start with the proposition that adequate water is the end of the analysis, not the beginning.”¹³⁴ Even in California, which has more aggressive water supply laws, practitioners have postulated that a mandatory water supply element in the state’s comprehensive planning law may be the next step in moving the state forward.¹³⁵

To the extent state environmental review laws consider water availability, they do so procedurally, and generally within the narrower context of a development or water project proposal.¹³⁶ Meanwhile, approaches where state agencies hold authority to assess water supply questions, although more uniform, detach the water supply question from the local land use context. On the other hand, approaches like Montana’s, where assessment of water availability is left to local government units, “leave the door open for disaggregated, independent water availability assessments.”¹³⁷ Mandatory utility planning is similarly decentralized, focused only on larger utilities, and suffering from a lack of meaningful coordination with land use planning.¹³⁸

These disparate efforts leave many gaps, create great inconsistencies, and ultimately fail to advance a cohesive community dialogue about water-climate preparedness throughout the West. If western communities adopted water-climate elements in their plans, this step would help bridge gaps, reconcile inconsistencies, and ultimately strengthen the

132. Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1292.

133. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 190.

134. *Id.*

135. *See generally* Waterman, *supra* note 46.

136. Discussed in Salkin, *supra* note 90, at 144–46.

137. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 194.

138. Hanak, *supra* note 37, at 85–87 (commenting on California’s urban water management planning laws).

assured supply laws existing today.

Second, comprehensive planning provides an appropriate locus for integrating the water-climate-land use question into a community's broader vision for itself. Patricia Salkin aptly summarizes the fundamental role of local comprehensive planning:

Typically, a comprehensive plan represents an articulation of the shared vision for the future growth and development of a municipality. Comprehensive plans often address issues relevant to future growth through elements concerning housing, public infrastructure needs, recreational facilities, transportation, economic development, open space, and agriculture. Some of these elements are required to be included in local plans under state enabling acts, while others are optional or are independently developed by local governments.¹³⁹

Because comprehensive planning is an established tool, it is easily amenable to the addition of another element, particularly if furthered by model enabling legislation. Indeed, the land use planning of today is largely the legacy of national model enabling legislation. In the 1920s, the U.S. Department of Commerce's Standard State Zoning Enabling Act and Standard City Planning Enabling Act spearheaded nationwide planning efforts.¹⁴⁰ The legislation, adopted by nearly all states, provided local governments with authority to create comprehensive plans, zoning regulations, and subdivision regulations. The model legislation also specified key elements that the plans should address, such as infrastructure, economic goals, housing, and the like.¹⁴¹ While communities approached planning and regulation in different ways, they did so within the common framework that model planning legislation provided.

Another successful example of model planning reform began in the 1990s as part of the smart growth movement, which ushered in sweeping nationwide revisions to state comprehensive planning statutes. Among other things, this

139. Salkin, *supra* note 90, at 125.

140. Copies of these model documents can be found at <http://www.planning.org/growingsmart/enablingacts.htm> (last visited June 12, 2013).

141. *Id.*

movement modernized state planning enabling acts to include topics such as natural resources protection and growth management.¹⁴² An important contribution of the smart growth movement is the American Planning Association's (APA) 2002 Growing Smart Legislative Guidebook,¹⁴³ which contains model planning statutes for a variety of modern issues. While the Guidebook begins to connect growth projections and water supply,¹⁴⁴ the topic of water is treated in a fairly traditional manner, addressed within other planning elements, such as utilities services, natural resources, or "critical resource areas."¹⁴⁵ The Guidebook does not have a freestanding element dedicated to water resources and, significantly, does not speak to climate change.

As with the model legislation of the past, model water-climate planning legislation has the potential to foster broad-based changes in the West. It provides states and local governments with a familiar, uniform starting point, and it complements existing reforms made by the APA and larger smart growth movement by providing updated content on the

142. For a summary of this movement and the political strategies involved, see Patricia Salkin, *Smart Growth at Century's End: The State of the States*, 31 URB. LAW. 601 (1999); David R. Godschalk, *Smart Growth Efforts Around the Nation*, POPULAR GOVERNMENT 12 (2000), available at <http://www.iog.unc.edu/pubs/electronicversions/pg/pgfal00/article2.pdf>.

143. American Planning Association, GROWING SMART LEGISLATIVE GUIDEBOOK: MODEL STATUTES FOR PLANNING AND THE MANAGEMENT OF CHANGE (Stuart Meek ed., 2002), available at <http://www.planning.org/growingsmart/guidebook/print/> [hereinafter GROWING SMART GUIDEBOOK].

144. *Id.* at 7-87 (stating that a land use element should note "the ability of existing transportation, water supply, treatment and distribution, wastewater treatment and collection, and other community facilities that have been or are being inventoried . . . to accommodate additional residential, commercial, industrial, and other development over the [twenty]-year planning period with existing capacities."). The Growing Smart Guidebook also mentions water use reduction as a benchmark for arid climates. *Id.* at 7-264.

145. Although not recommending any specific legislative language, the Growing Smart Guidebook suggests under the natural resources element that:

Understanding the carrying capacity or constraints of natural resources (particularly ground and surface water systems) provides local governments with an effective method for identifying which portions of the community or region are most suitable sites for new or expanded development. Similarly, knowledge of carrying capacity limitations allows local government residents and officials to make more rational and defensible decisions regarding how and where development may occur in critical and sensitive areas.

Id. at 7-136 to 7-142.

most significant issue of our time.

Third, comprehensive planning provides a forum for public participation, which is critical for effective water-climate-land use planning. Unlike assured supply laws that place the public in a reactive posture during a specific development proposal, general planning processes ask the community to look forward and proactively plan their future.¹⁴⁶ As discussed below, this community voice becomes particularly important on matters where inter-agency and inter-jurisdictional coordination are necessary.¹⁴⁷ Meaningful water-climate planning means that local governments can take an informed, proactive role when other levels of government raise water-land use questions.¹⁴⁸ Local government interests are implicated in everything from federal ESA biological opinions, to federal-state environmental review of water projects, to state-tribal water rights compacting, to state water rights permitting and climate planning. A robust water-climate element in a comprehensive plan can thus mean the difference between a direct decision making role or sitting on the sidelines.

Fourth, the EPA's Guiding Principles of Adaptation recommend that adaptation strategies be integrated into larger planning processes and programs "whenever possible."¹⁴⁹ Because comprehensive planning is the sine qua non of local planning, it is therefore the appropriate place to implement local adaptation strategies. Further, the Guiding Principles of Adaptation share striking commonalities with the processes and objectives of local comprehensive planning, calling for the collection of data, "coordination across multiple sectors," identification of priorities, analysis of environmental, social, and economic implications, and assessment of

146. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 189; *see also* Arnold, *Adaptive Watershed Planning*, *supra* note 102, at 443 (noting the many social benefits reaped when water planning is done adaptively to reflect the "principles of deliberative participatory democracy").

147. *See* discussion *infra* Part III.D.6.

148. Tarlock and Bates advocate for local values in water decisions and note with concern the "long-standing social policy that the [state] government has no special responsibility to protect communities" because "statewide interest in water rests on the entrenched policy that water should be put to its highest economic use." Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 179–84.

149. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 33.

outcomes.¹⁵⁰ In other words, traditional comprehensive planning practices replicate the very practices recommended for adaptation planning, making the water-climate planning element a complementary fit.

Fifth, in many states, the comprehensive plan carries legal weight because it serves as the underpinnings for land use ordinances and decisions. These states, which follow the “consistency doctrine,” require that the land use laws and decisions be carried out in accordance with the comprehensive plan.¹⁵¹ As Tarlock and Lucero have discerned, “[t]he consistency doctrine is the linchpin to connect land, water, and growth” because it moves communities from the rhetorical to the concrete through implementation.¹⁵²

The cases of Washoe County, Nevada, and Yamhill County Oregon, discussed in Part I, aptly illustrate this doctrine in the assured supply context. In both cases, development approvals were reversed for failure to implement water supply requirements contained in the counties’ comprehensive plans.¹⁵³ A substantive water-climate element can similarly provide a strong mechanism for enforcing water supply and climate considerations.

Finally, if a mandatory water-climate element were adopted throughout the western states, it would be the first time that local jurisdictions collectively focused on this important topic. In shared watersheds, there would be cooperative planning that might not otherwise take place. And the water-climate element would be linked to the whole of a community’s concerns, rather than functioning as an isolated side topic. This approach would also place assured supply on a long-term planning track less vulnerable to in-the-moment pressures of a specific development proposal. Even if some states treated a water-climate element as optional, the odds of more

150. *Id.*

151. Several states in the West apply the consistency doctrine in planning, including Arizona, California, Nebraska, Oregon, and Washington. Stuart Meck, *The Legislative Requirement that Zoning and Land Use Controls be Consistent with an Independently Adopted Local Comprehensive Plan: A Model Statute*, 3 WASH. U.J.L. & POL’Y 295 (2000). Montana also has such a requirement. MONT. CODE ANN. §§ 76-1-605, 76-2-203, 76-2-304 (2011).

152. Tarlock & Lucero, *supra* note 20, at 978; *see also* Lucero, *Comments: Connecting Water and Land*, WET GROWTH, *supra* note 17, at 448.

153. *See supra* notes 72, 75–78.

meaningful planning throughout the West are increased. In short, a water-climate element would create momentum.

This does not mean that state enactment of model legislation will be politically easy. Nor, after enactment, will comprehensive planning become the panacea for all water-climate-land use concerns. Traditional barriers must be acknowledged, including the lack of resources or political will to implement planning goals, state preemption of local planning, local presumptions about the duty to serve growth, and the lack of local control over water permitting.¹⁵⁴ At the same time, no other planning tool presents itself as better-suited to advancing local water-climate response and positioning communities to be responsible partners in larger state and national water-climate efforts.

B. *Gathering Good Guidance and Best Practices*

While model legislation is in order, there is no need to start from scratch. Rather, by gathering the best wisdom from successful planning efforts on the ground, a list of key provisions for a water-climate element emerges. In addition to the 2012 King County Comprehensive Plan Update,¹⁵⁵ which provides an excellent list of topics for inclusion, there are other notable sources of big-picture guidance on how a water-climate element should be approached. What these best practices make clear is that water-climate planning is not planning as usual, but instead requires a more rigorous, dynamic approach.

On the water supply side, Davies has suggested in the assured supply context that for laws to effectively address the water-land use connection, they must be (1) compulsory, (2) stringent, (3) universal, (4) granular, and (5) interconnected.¹⁵⁶ This advice applies with equal force to local water-climate planning. To be effective, a water-climate element must: be required; be rigorous enough for communities to take a hard look at their local situation; include all communities, regardless of size; examine all land use holistically, rather

154. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 174–79.

155. See discussion *supra* Part II.

156. Davies, *Assessing the Value of Assured Supply Laws*, *supra* note 10, at 1280–91.

than targeting selected large development; and integrate with the planning efforts of other local, tribal, state, and federal jurisdictions, as well as water utilities, irrigation districts, power companies, and other private stakeholders.

On the land use side, the APA Growing Smart Guidebook observes that model planning legislation should require plans that: contain sufficient detail and specificity, reflect integration among the plan elements, involve public participation, undergo ongoing evaluation and periodic revision, and consider the regional context.¹⁵⁷ The Guidebook further recommends that planning be mandatory.¹⁵⁸

To this general planning advice, Tony Arnold would add the importance of adaptive planning.¹⁵⁹ Adaptive planning is “an iterative and evolving process of identifying goals and making decisions for future action that are flexible, contemplate uncertainty and multiple possible scenarios, include feedback loops for frequent modification to plans and their implementation, and build planning and management capacity to adapt to change.”¹⁶⁰ Because conventional land use plans can be static and locked into particular time intervals, they can be ill-suited to the uncertainties surrounding water resources and climate.¹⁶¹ Adaptive planning thus introduces greater potential for a water-climate element to be flexible and continuously adjusted as new data, models, and predictive tools become available.¹⁶²

On the climate change side, in its Guiding Principles of Adaptation, the EPA recommends adaptation strategies that closely dovetail best practices in comprehensive planning:

- **Adopt integrated approaches** that include adaptation within existing policies and programs.
- **Use best-available science** about “climate change risks, impacts and vulnerabilities.”
- **Build strong partnerships** that coordinate “across

157. GROWING SMART GUIDEBOOK, *supra* note 1434, at 7-61 to -64.

158. *Id.* at 7-65 to -66.

159. *See generally* Arnold, *Adaptive Watershed Planning*, *supra* note 102.

160. *Id.* at 440; *see also generally* Craig, *supra* note 91, (discussing the nonlinear, recursive approach required for climate change adaptation).

161. *Id.* at 454–56.

162. *Id.*

multiple sectors and scales.”

- **Apply risk-management methods and tools** “to help identify, assess and prioritize options to reduce vulnerability” to climate change.
- **Apply ecosystem-based approaches** to “increase ecosystem resilience and protect critical ecosystem services on which humans depend.”
- **Maximize mutual benefits** by using “strategies that complement or directly support” other initiatives, such as “efforts to improve disaster preparedness, promote sustainable resource management, and reduce greenhouse gas emissions.”
- **Continuously evaluate performance** by using “measurable goals and performance metrics” to “assess whether adaptive actions are achieving desired outcomes.”¹⁶³

Along similar lines, Craig recommends five overarching principles of climate adaptation planning: (1) monitor and study everything all the time; (2) eliminate or reduce non-climate change stresses and otherwise promote resilience; (3) plan for the long term with much increased coordination across media, sectors, interests, and governments; (4) promote principled flexibility in regulatory goals and natural resource management; and (5) accept—really accept—that climate change adaptation will often be painful.¹⁶⁴ These and other best practices¹⁶⁵ inform the following discussion of the key provisions necessary in model legislation for a water-climate element in local comprehensive plans.

163. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 33.

164. *See generally* Craig, *supra* note 91.

165. Two additional climate planning resources are ICLEI OCEANA: LOCAL GOVERNMENT CLIMATE CHANGE ADAPTATION TOOLKIT (2008), *available at* http://archive.iclei.org/fileadmin/user_upload/documents/ANZ/CCP/CCP-AU/Projects/AI/AdaptationToolkit/Toolkit_CCPAdaptation_Final.pdf (prepared for the Commonwealth of Australia); CLIMATE CHANGE HANDBOOK FOR REGIONAL WATER PLANNING (2011), *available at* http://www.water.ca.gov/climatechange/docs/Climate_Change_Handbook_Regional_Water_Planning.pdf (prepared for the U.S. EPA Region 9 and California Dept. of Water Resources).

C. *Key Provisions of Model Legislation for a Water-Climate Element*

Model enabling legislation for a water-climate element in comprehensive plans should contain the following provisions:

- (1) **Compulsory & Universally Applicable.** All local government units within the state must adopt a water-climate element in their comprehensive plan. To the extent other plan elements are optional, this element should nonetheless be mandatory due to the urgent nature of climate change.
- (2) **Water Resources & Climate Inventory.** Using best available data and science, local governments must conduct a water resources-climate inventory that includes: the hydrologic features of the jurisdiction, including both natural and artificial infrastructure, along with floodplains, wetlands, and other critical water resources; interrelationships between ground and surface water supply, including the impacts of exempt wells; interrelationships between water quantity and water quality; differentiation between actually available versus legally available “paper” water; and a long term evaluation of climate impacts and supply variability over hydrologic time. Where data uncertainties exist, those must be disclosed.
- (3) **Land Use Capacity & Vulnerability Analysis.** Based on the water resources-climate inventory, local governments must engage in a capacity-vulnerability analysis that draws on population projections and land use models discussed elsewhere in the comprehensive plan. This analysis should consider whether, factoring in climate change, the water resources of the community are adequate to serve land use projections. This analysis should include both intensity and location of uses, particularly in areas of groundwater recharge, shallow aquifers, and flood-prone areas. Importantly, this analysis should also identify the community’s primary water vulnerabilities due to climate change.
- (4) **Goals & Priorities.** Based on the capacity-vulnerability analysis, local governments must prioritize water uses according to how their community will use water supply over time. Local governments must also identify specific water supply goals—such as

improved stream flows, cleaner water, more access to water, water conservation, repatriation of local supplies that are moved out-of-basin, etc.—and set benchmarks for measuring success toward those goals.

(5) **Implementation Strategies.** Local governments must identify the specific steps they will take to implement their water-climate goals, including both macro- and micro-level efforts. These implementation strategies should tie back to goal benchmarks.

(6) **Coordination Planning.** In preparing the water-climate element, local governments must coordinate with other institutions that share a common water source. This coordination should include other local governments, as well as tribal, state, federal, and interested non-governmental stakeholders. The element should also describe how a local government will coordinate with these partners in the long term as new water-climate issues arise, including through shared data, joint planning, and the use of joint implementation agreements.

(7) **Water Market Planning.** In recognition that shared supply is a reality, both for communities with water surpluses and those with deficits, local governments must assess opportunities for water marketing. Marketing can include the use of inter-governmental agreements with local, state, federal, and tribal entities to address regional adaptation to changing water resources.

(8) **Regular Updating & Continuous Assessment.** The water-climate element must undergo continuous assessment of its goal benchmarks, and regular revisiting and updating of its data, priorities, goals, and implementation strategies.

Coming in the form of a state planning directive, this water-climate element requires communities to proactively plan development within the context of changing climate and water supply. Communities will be less likely to react to each development in isolation or proceed under a “duty to serve” paradigm where they feel compelled to embark on a never-ending quest to find more water.¹⁶⁶ Planning can also

166. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5,

transcend jurisdictional boundaries within a watershed or basin. And while this model framework envisions some basic uniformity from one community to the next, it also allows room for each community to identify its unique vulnerabilities, goals, and strategies based on its water-climate realities.

D. *Examining the Key Provisions in Greater Detail*

What follows are brief explanations and case studies that elaborate upon the key provisions in the model water-climate element legislation.

1. *Compulsory and Universal Requirements*

While states vary in whether they require or merely authorize local comprehensive planning,¹⁶⁷ the urgency of population growth, over-tapped water supplies, and dramatic climate change impacts in the West underscore the need for a mandatory water-climate element. Furthermore, effective state enabling legislation should require that *all* local governments (regardless of size) engage in water-climate planning and look broadly at the impacts of *all* land uses (rather than selected categories of land use). This universality avoids the large loopholes created under some assured supply laws, such as California's exclusion of developments under 500 units,¹⁶⁸ Arizona's limitation to dense urban areas,¹⁶⁹ Nevada's limitation to subdivisions of five-lots or more,¹⁷⁰ or Montana's multiple exemptions from subdivision review.¹⁷¹

Universality also promotes broadened conversation and

at 175 ("This presumed duty has enabled cities to separate water supply from land use issues and fueled the race to lock up adequate supplies.").

167. The American Planning Association reports that ten states have optional local planning, twenty-five states conditionally mandate local planning, and fifteen states mandate local planning. GROWING SMART GUIDEBOOK, *supra* note 1434, at 7-278. These planning approaches are well summarized in Edward J. Sullivan & Matthew J. Michel, *Ramapo Plus Thirty: The Changing Role of the Plan in Land Use Regulation*, 35 URB. LAW. 75 (2003).

168. See discussion *supra* Part I.A.

169. ARIZ. REV. STAT. ANN. §§ 32-2181(F), 45-108 (2013).

170. NEV. REV. STAT. ANN. § 278.320 (2011).

171. Among other exemptions, Montana exempts divisions of land under 160 acres, as well as divisions of land where the lots are transferred to family members. MONT. CODE ANN. §§ 76-3-103(15), -104, -201 to -209 (2011).

more meaningful coordination among jurisdictions, as discussed below. And to the extent that neighboring states adopt the same enabling legislation, it increases the possibility of shared governance over interstate water sources.

2. *Comprehensive Water Resources Data that Reflects Climate Realities*

Water resources and climate data is foundational to the remaining provisions in the water-climate element, and also demands a great deal from local governments. To be done well, it will require: funding of research and modeling, acknowledging vast areas of uncertainty, integrating surface and groundwater data, considering the nexus between water quantity and quality, meaningfully differentiating between actual water availability versus paper water rights, and developing a longer planning horizon for hydrologic time.

Research and Modeling. All too often, communities grapple with the question of whether to invest financial and technical resources in planning studies. But the risks of not gathering water-climate data are simply too great. As Craig notes, “[l]ike war and epidemic diseases, climate change adaptation could well become a matter of community survival.”¹⁷² She calls for robust data that includes ecological baselines, as well as projections of how climate change may affect ecosystem functions and services.¹⁷³

Regarding the importance of science-informed water planning, the APA’s Growing Smart Guidebook lays out several compelling reasons that range from the practical to the legal. In particular, scientific analysis:

- “provides the community with a powerful tool for making decisions and choices about how to resolve conflicts between development and preservation goals”;
- allows informed public debate and reduces reliance on “opinions, unsubstantiated by scientific research”;
- “flags potential problems in advance of development, providing predictability”;
- avoids belated discovery of an environmental issue

172. Craig, *supra* note 91, at 40. For a list of potential risks, see *infra* Part III.D.3.

173. *Id.* at 41.

“at the time a development proposal is well along”; and

- provides a “factual basis for specialized land development regulations . . . [so that a local government] may avert or minimize a taking claim when development must be severely restricted.”¹⁷⁴

The APA also notes that a great deal of information on aquifers, watersheds, and wellhead protection areas has already been gathered by state and federal agencies, as well as water utilities and nonprofit organizations.¹⁷⁵ Particularly in states like Washington and California, with mandatory requirements for utility water supply planning, there are clear opportunities for communities to access meaningful supply information.¹⁷⁶

But basic water data alone will not suffice. The greatest challenge lies in understanding how climate change modifies that basic data. “[T]he unfortunate current reality is that we have very little idea what climate change impacts will actually be, especially at the local level.”¹⁷⁷ For this reason, it is incumbent on local governments to join forces with other stakeholders to increase the collective resources applied to water-climate research. King County, for example, collaborated with a state university in generating regionally relevant climate data for its local planning.¹⁷⁸

Acknowledged Uncertainty. Even using best available science, there will be areas of uncertainty to squarely acknowledge. Acknowledged uncertainties not only shed light on vulnerabilities, but also serve to highlight future steps local governments and their partners can take to build more accurate models. In its own planning documents, EPA acknowledges that:

[T]he complex interactions of climate change impacts mean that uncertainties and data gaps persist and that multiple Agency stakeholders have a role to play in developing a research agenda. In order to identify the most pressing science needs for improved adaptation

174. GROWING SMART GUIDEBOOK, *supra* note 144, at 7-137.

175. *Id.* at 7-138 to -139.

176. See discussion *supra* Part I.A.

177. Craig, *supra* note 91, at 40.

178. KING COUNTY 2007 CLIMATE PLAN, *supra* note 10910, at 3-4.

decision making, priority research needs related to climate change adaptation will be identified and periodically updated.¹⁷⁹

Among the greatest areas of uncertainty, EPA identifies “local impacts to precipitation and hydrology for use in planning long-lived water infrastructure” and “shifts in water quality and aquatic ecosystems in watersheds.”¹⁸⁰ There is further uncertainty surrounding shifts in ecological thresholds—the “point at which there is an abrupt change in an ecosystem quality, property, or phenomenon, or where small changes in one or more external conditions produce large and persistent responses in an ecosystem.”¹⁸¹

Following the directives of the California judiciary, water supply uncertainty is a fundamental piece of information that should be disclosed and analyzed.¹⁸² If uncertainties are established in a water-climate element, local governments are more likely to confront the issue during subdivision review. Similarly, uncertainty can play a key role during state water rights permitting. In the noted *Waiahole Ditch* decision,¹⁸³ for example, the Hawaii Supreme Court cited uncertainty about instream flow impacts when it restricted commercial use of a proposed water right, even though commercial activities were envisioned under the property’s land use designation. Adopting the precautionary principle from environmental law, the court held that further studies were required:

Where scientific evidence is preliminary and not yet conclusive . . . it is prudent to adopt “*precautionary principles*” in protecting the resource. That is, where there are present or potential threats of serious damage, lack of full scientific certainty should not be a basis for postponing effective measures to prevent environmental degradation In addition, where uncertainty exists, a trustee’s duty to protect the resource mitigates in favor of choosing presumptions

179. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 40 (emphasis omitted).

180. *Id.* at 13.

181. Craig, *supra* note 91, at 41-42 (citing U.S. CLIMATE CHANGE SCI. PROGRAM, SYNTHESIS & ASSESSMENT PRODUCT 4.2: THRESHOLDS OF CLIMATE CHANGE IN ECOSYSTEMS 1 (2009)).

182. See discussion *supra* Part I.B.

183. *In re Water Use Permit Applications*, 94 Haw. 97, 9 P.3d 409 (Haw. 2000).

that also protect the resource¹⁸⁴

As one case in point, King County has disclosed climate data uncertainties in its Comprehensive Plan and noted the need for “precaution” on questions that cannot yet be answered.¹⁸⁵ The Great Lakes-St. Lawrence River Basin Water Resources Compact is also illustrative, providing that in the face of scientific uncertainty the participants will nonetheless collectively begin protecting the basin’s ecosystem through extensive prohibitions on water diversions.¹⁸⁶ Along related lines, Craig advocates for “‘no regrets’ adaptation strategies—that is, measures that will increase resilience and the capacity to adapt to particular climate change impacts if those impacts actually occur, but will still enhance overall social welfare even if they do not materialize.”¹⁸⁷

Integrated Surface and Groundwater Data. A water-climate element should recognize the interrelationship between surface and groundwater supply. Integrated data includes a water or “hydrologic budget,” which hydrologists define as “an accounting of the inflow to, outflow from, and storage in, a hydrologic unit” such as a drainage basin or aquifer.¹⁸⁸ Inflows include precipitation and runoff, and outflows include natural phenomena such as evapotranspiration as well as human-driven consumption. By developing such a budget, communities gain a greater sense of whether (and when) surpluses or deficits exist. This integrated approach responds to criticism about states such as Arizona that focus almost exclusively on groundwater without studying overall

184. *Id.* at 466–67, n.59 (emphasis in original).

185. 2012 KING COUNTY COMPREHENSIVE PLAN UPDATE, *supra* note 1134, at 4-38 to -39.

186. GREAT LAKES-ST. LAWRENCE RIVER BASIN WATER RESOURCES COMPACT §§ 1.3(2), 4.8, 4.9 (2005), *available at* http://www.cglg.org/projects/water/docs/12-13-05/Great_Lakes-St_Lawrence_River_Basin_Water_Resources_Compact.pdf. The Compact recognizes uncertainty in “demands that may be placed on Basin Water, including groundwater, levels and flows of the Great Lakes and the St. Lawrence River, future changes in environmental conditions, the reliability of existing data and the extent to which Diversions may harm the integrity of the Basin Ecosystem.” *Id.* at § 4.5.

187. Craig, *supra* note 91, at 67.

188. *Science in Your Watershed: General Introduction and Hydrologic Definitions*, U.S. GEOLOGICAL SURVEY, <http://water.usgs.gov/wsc/glossary.html#Hydrologicbudget> (last visited June 12, 2013).

hydrological system functions.¹⁸⁹ California, in contrast, requires that urban utilities plan not only for surface water supply, but also groundwater and overdraft concerns.¹⁹⁰

Quantity and Quality. Policymakers will achieve little in protecting water availability unless the quality of the water is also sufficient to meet community needs. Water quality-quantity is another area of historic legal fragmentation that can be better integrated at the planning stage,¹⁹¹ rather than the typical states' practice of examining quality during development approval.¹⁹² Local preparedness on this question can also provide a strong point of integration with federal and state water quality programs such as total maximum daily load (TMDL) initiatives¹⁹³ and the designation of active management groundwater areas.¹⁹⁴ Since land use is a primary driver of water quality,¹⁹⁵ it makes abundant sense

189. ARIZ. REV. STAT. ANN. § 45-401 to -605 (2013).

190. For a detailed discussion of this provision, see Kevin M. O'Brien, Symposium, *Alice in Groundwater Land: Water Supply Assessments and Subsurface Water Supplies*, 4 GOLDEN GATE U. ENVTL. L.J. 131 (2010).

191. Arnold, *Introduction*, WET GROWTH, *supra* note 17, at 40 (discussing how "dispersion of authority is by subject matter").

192. *E.g.*, MONT. CODE ANN. § 76-3-622(e) (2011) (examining water quality and quantity at time of subdivision). In Montana, quality is a question for the state Department of Environmental Quality, whereas quantity is a question for the state Department of Natural Resources & Conservation. Thus, there is compounded fragmentation both at the state level on water questions and the local government level on land use versus water questions—a fragmentation that subverts the ability to do holistic planning. *See also* ARIZ. REV. STAT. ANN. §§ 9-463.01(I), 11-823 (2013) (requiring certification of water quality as part of adequate supply).

193. Total maximum daily load means "the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards." TMDLs are addressed in detail at EPA, *Impaired Waters and Total Maximum Daily Loads*, <http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/index.cfm> (last visited June 12, 2013). Established under the Clean Water Act, these programs require state and tribal governments to identify quality impaired waters and establish programs, particularly those utilizing best management practices, to improve the quality of the waters. *Id.*

194. *E.g.*, ARIZ. REV. STAT. ANN. § 45-401 to -421 (2013) (active management areas); MONT. CODE ANN. § 85-2-506 (2011) (controlled groundwater areas); NEV. REV. STAT. §§ 534.011, .030 (2011) (active management areas); WYO. STAT. ANN. § 41-3-912 (2011) (control areas).

195. Land use contributes greatly to nonpoint source pollution through stormwater runoff and other sources, adding sediment loads and pollution to surface and aquifer drinking water supplies. *Sources, Stressors, and Responses: Urbanization*, U.S. ENVTL. PROT. AGENCY, http://www.epa.gov/caddis/ssr_urb_intro.html (last visited June 12, 2013). In Montana, the vast majority of controlled groundwater areas arise due to land use generated contamination. *See generally Controlled Ground Water Areas*, DEP'T OF

that local governments should work with state and federal agencies in developing best management practices, density restrictions, and other land use controls that support water quality programs.

Data Beyond Mere “Paper Rights.” Again drawing on the more rigorous standards imposed by the California judiciary,¹⁹⁶ accurate water-climate planning should require that supply be substantiated beyond mere paper water rights. This approach moves communities away from the “more lax, or amorphous”¹⁹⁷ approaches seen in states like Montana and Nevada, where evidence of water availability can be as lean as an existing “well log,” test from a nearby well,¹⁹⁸ or a paper certificate from a stage agency.¹⁹⁹ Additionally, supply projections should take into consideration the impact of exempt wells on the overall availability of water, since those groundwater withdrawals are often allowed to occur regardless of whether water is legally or physically available.²⁰⁰

Longer Time Horizon. Although the APA generally recommends a twenty-year planning window (updated in five-year intervals) for comprehensive plans,²⁰¹ a longer planning window is appropriate for water supply. Bob Adler observes that “a couple of decades is a blip in hydrological time” and such a narrow focus “can mask much larger, longer-term fluctuations in climate and river flows.”²⁰² A lengthier planning horizon also makes sense when considering the permanency of land use structures and their dependence on water.

Davies believes that “projections on the order of 100 years or longer would seem reasonable as a starting point for an assured supply deemed well rooted in sustainability’s forward-

NATURAL RES. & CONSERVATION WATER RES. DIV., http://dnrc.mt.gov/wrd/water_rts/cgwa/default.asp (last visited June 12, 2013).

196. See discussion *supra* Part I.B.

197. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 196.

198. MONT. CODE ANN. § 76-3-62(e) (2011).

199. NEV. REV. STAT. ANN. § 278.377(1)(b) (2011).

200. See *supra* note 8, and related text.

201. GROWING SMART GUIDEBOOK, *supra* note 1434, at 7-84 to -86.

202. Robert W. Adler, *Revisiting the Colorado River Compact: Time for A Change?*, 28 J. LAND RESOURCES & ENVTL. L. 19, 31 (2008) (commenting on Colorado River data deficiencies).

looking aim.”²⁰³ This time frame is in keeping with Arizona’s requirement that development have a 100-year water supply,²⁰⁴ and moves well beyond California’s twenty-year window, not to mention Montana, Nevada, and Colorado,²⁰⁵ which have no specific time horizon in their assured supply laws. Beyond this 100-year minimum, communities could have discretion to lengthen their planning period. El Paso County, Colorado, for example requires developers to demonstrate a “renewable groundwater life” of 300 years.²⁰⁶

3. *Capacity-Vulnerability Analysis: Connecting Water-Climate Data and Land Use Projections*

With water-climate data in hand, a local government is equipped to view that data alongside population studies from the land use element of its comprehensive plan. By connecting these important areas of inquiry, a community can identify whether its hydrologic capacity meshes with its growth projections, and where it may be vulnerable to climate change.

Capacity. The APA Growing Smart Guidebook calls such a comparison a “conflicts analysis”—identification of “conflicts between a local government’s critical and sensitive resources and the growth and development programs contained in the local comprehensive plan.”²⁰⁷ Others advocate moving beyond mere comparison, to an overall “[r]ethinking [of] [d]emand [p]rojections.”²⁰⁸ Since growth projections drive water supply acquisition, it is critical to (1) rigorously scrutinize projections to ensure they are not inflated and (2) in light of improvements in water technology, examine assumptions about the amount of water needed to serve households and other land uses.²⁰⁹

203. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 189.

204. ARIZ. REV. STAT. ANN. §§ 45-108(I), 45-576(J) (2013).

205. Davies, *Assured Water Supply Laws in the Sustainability Context*, *supra* note 11, at 191 (citing NEV. REV. STAT. ANN. § 278.377(1)(b) (2011); MONT. CODE ANN. § 76-3-622(e) (2011); COLO. REV. STAT. ANN. § 30-28-133(3)(d) (2012)).

206. EL PASO COUNTY LAND DEVELOPMENT CODE § 8.4.7 (Feb. 2013), <http://adm.elpasoco.com/Development%20Services/Pages/LandDevelopmentCode.aspx>.

207. GROWING SMART GUIDEBOOK, *supra* note 144, at 7-141 to -142.

208. Klein & Kenney, *supra* note 47, at 9.

209. *Id.* (citing downward adjustments by the Colorado Water Conservation Board and the City of Seattle, Washington as two examples).

Additionally, communities should explore whether large-scale density adjustments can bring land use patterns into alignment with hydrologic realities. John Nolon, for example, has argued that “[a]s our concerns over the consequences of climate change heighten, the legal system must continue to adapt and lead the way to create climate friendly settlement patterns.”²¹⁰ He makes a case for more compact, urban-connected developments that reduce both the amount of water consumed per household, as well as the amount of infrastructure costs associated with water delivery:

Historically, single-family, suburban homes use more than 101 gallons of water per capita per day, while multifamily housing can use as little as 45–70 gallons. Lawn care alone is responsible for up to fifty percent of annual household water usage, while car washing, swimming pools, and other outdoor water uses comprise up to twenty percent more. Studies have shown that at higher densities, water usage drops to half the amount of lower density areas.

Moreover, costs for installing water infrastructure to houses in dispersed suburban neighborhoods . . . and water service costs are proportionately lower in denser developments.²¹¹

Vulnerabilities. Comparing land use projections and water-climate data also helps identify a community’s greatest vulnerabilities—a step that EPA’s Draft Climate Change Adaptation Plan emphasizes as one of high importance.²¹² While all communities will experience vulnerabilities, “economically deprived communities may be particularly at risk, both for access to clean and safe water as well as for their ability to respond to emergencies during extreme events.”²¹³

210. John R. Nolon, *The Land Use Stabilization Wedge Strategy: Shifting Ground to Mitigate Climate Change*, 34 WM. & MARY ENVTL. L. & POL’Y REV. 1, 11 (2009).

211. *Id.* at 14–16. Nolon estimates significant water savings: “If we could shift twenty-five percent of the nation’s next forty million households, or ten million households (twenty-seven million people), from single-family dwellings on quarter acre lots to [high density developments of around 125 dwelling units per acre], the corollary benefits to the environment would be dramatic. To illustrate, such a shift would save: . . . 876,951 acres of impervious coverage; . . . 477 billion gallons of stormwater runoff per year, and . . . 394 billion gallons of potable water per year.” *Id.* at 17–18.

212. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 18–19.

213. *Id.* at 19.

Additionally, Craig notes that “ecosystems . . . already coping with other problems, such as pollution, habitat destruction, and loss of biodiversity, are [also] more vulnerable to climate change impacts than systems not already suffering from such stresses.”²¹⁴ The EPA sets forth a voluminous list of local-level water vulnerabilities that include:

Water Quality

- Warmer temperatures and lower flows can result in “additional water bodies not meeting water quality standards and being listed as impaired” and can increase harmful algal blooms and other invasive species that threaten public health.
- Increased flooding and rainfall intensity can amplify “pollutant loads in runoff,” “lead to contaminant releases” from cleanup sites and “disrupt waste management networks,” increasing sewer overflow and wastewater bypass that ends up in streams.
- Sea-level rise could cause “saltwater intrusion, encroaching upon coastal drinking water supplies.”

Aquatic Habitat Health

- Warmer waters and other ecological shifts will “threaten aquatic habitats and aquatic species, such as cold water fisheries, with the potential for significant impacts on subsistence fishing tribes.”
- The velocity of runoff from increased storm intensity “will scour and erode creek beds.”
- Increased drought and wildfires can alter the “structure and function of wetlands and watersheds.”
- Sea-level rise and coastal development can increase erosion and harm coastal wetlands and zones that support aquatic species.

Water Quantity

- Communities will face “managing competition between municipal supplies, energy production, industrial use, agricultural use, and ecological needs.” Pressure to use alternative energy sources will increase demands on water as well.
- Reduced snowpack or precipitation may pressure communities to tap aquifers and develop more

214. Craig, *supra* note 91, at 43.

underground water storage.

Water Infrastructure

- Rainfall, sea-level rise, and storm events “beyond the design capacity of drinking water, wastewater and stormwater infrastructure . . . could overwhelm and damage infrastructure.”²¹⁵

Local governments can thus use the EPA’s list as a starting place for inquiry. And once a community has a clear sense of its capacity and vulnerabilities, it can then set its priorities and goals for addressing water supply and climate change.

4. *Water-Climate Goals & Priorities Measured by Benchmarks*

The water-climate element should build upon underlying data and capacity-vulnerability analysis by identifying goals and priorities to address during the element’s planning horizon. In this stage of water-climate planning, the public’s role is particularly important because the plan must “protect and balance agricultural, environmental, economic, municipal, and cultural uses of water.”²¹⁶

To help set priorities and goals, EPA stresses the importance of “developing decision-support tools to improve the quality and efficacy of decisions related to outcomes that are sensitive to changes in climate.”²¹⁷ Lucero further emphasizes that enabling legislation should require specificity about what party is responsible for meeting particular goals, along with timetables for reaching goals.²¹⁸ The APA Growing Smart Legislative Guidebook similarly calls for “benchmarks and procedures to monitor the effectuation of the plan.”²¹⁹ Effective performance benchmarking uses baseline indicators, thresholds, and outcomes to “periodically track the

215. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 17–21.

216. Lucero, *Comments: Connecting Water and Land*, WET GROWTH, *supra* note 17, at 447.

217. EPA DRAFT ADAPTATION PLAN, *supra* note 86, at 39. Two such support tools are the ICLEI Oceana: Local Government Climate Change Adaptation Toolkit and the California-EPA Region 9 Climate Change Handbook for Regional Water Planning, *supra* note 165.

218. Lucero, *Comments: Connecting Water and Land*, WET GROWTH, *supra* note 17, at 447–48.

219. GROWING SMART GUIDEBOOK, *supra* note 143, at 7-151.

achievement of those desired outcomes.”²²⁰

Examples of concrete benchmarks include water conservation targets like California’s target for twenty percent per capita reduction in urban water use by 2020 in the Bay-Delta area;²²¹ targets for sensitive lands acres preserved from development;²²² or targets for residential acreage present in the floodplain.²²³ The APA cites Washington as an example: “Prompted by the Washington state growth management act, King County and 35 cities in the Seattle metropolitan area established and adopted a benchmarking system in 1994 to monitor the effectiveness of countywide planning policies” through the use of reports that track benchmark outcomes.²²⁴ King County is tracking surface and groundwater quality data, Chinook salmon returns, amount of forest land, decreases in domestic water consumption, and aquatic habitat continuity based on goals in its comprehensive plan.²²⁵ Oregon also has a state-level benchmark system that addresses economic, social, and environmental goals and encourages local governments to establish complimentary programs.²²⁶

5. *Implementation Through Detailed Strategies*

The water-climate element also should address how goals and priorities will be implemented, including through zoning and subdivision regulations, incentives, educational programs, and other cooperative efforts. Particularly in states that recognize the consistency doctrine, implementation through zoning and subdivision is an important way to give teeth to a

220. *Id.* at 7-261.

221. *See generally* CAL. DEP’T OF WATER RES. ET AL., 20X2020 WATER CONSERVATION PLAN (Feb. 2010), <http://www.water.ca.gov/wateruseefficiency/sb7/docs/20x2020plan.pdf> (using baselines and targets for ten hydrologic regions).

222. GROWING SMART GUIDEBOOK, *supra* note 143, at 7-263.

223. *Id.* at 7-264.

224. *Id.* at 7-261.

225. *See generally* KING COUNTY OFFICE OF STRATEGIC PLANNING AND PERFORMANCE MANAGEMENT, KING COUNTY BENCHMARKS: ENVIRONMENT (2009), http://your.kingcounty.gov/budget/benchmrk/bench09/environment/Environment_09.pdf.

226. For information on the ninety state benchmarks and participating local governments, see OREGON PROGRESS BOARD, <http://benchmarks.oregon.gov/> (last visited June 12, 2013).

water-climate element.²²⁷

Much has been written on specific ways that local governments can modify land use regulations to address water-climate issues. Roughly speaking, these implementation strategies fall into micro-level strategies affecting project site design and macro-level strategies affecting a community's area-wide systems and hydrology. Here again, implementation strategies should specify responsible parties and timetables.²²⁸

Micro-Level Implementation. Salkin lists a variety of emerging site design approaches that include: green buildings that conserve water use, rainwater and storm water collection, xeriscaping requirements, vegetative ground covers and other permeable surfacing, and green and cool roofs.²²⁹ Another emerging idea is the “water neutral” development that requires developers to offset project needs with water efficiency savings. In California, projects in the East Bay Municipal Utility District have been required to meet 1:1 and 2:1 offsets, through both on-site and off-site actions.²³⁰ Onsite, water efficient fixtures and irrigation, turf limitations, lot water budgets, and recycled water have resulted in a nearly thirty percent savings compared to a conventionally designed development. Offsite, developers have paid a mitigation fee used by local utilities to finance similar water efficiency measures within their service areas.²³¹

Macro-Level Implementation. Moving beyond project site design, there are implementation measures for the watershed and regional level. Climate specialists at the California Department of Water Resources promulgated a list of macro-level strategies that include:

227. See discussion *supra* Part III.A.

228. GROWING SMART GUIDEBOOK, *supra* note 143, at 7-151 to -152.

229. Salkin, *supra* note 90, at 159–70 (citing examples from various local government ordinances); see also generally U.S. ENVTL. PROT. AGENCY, GROWING TOWARD MORE EFFICIENT WATER USE: LINKING DEVELOPMENT, INFRASTRUCTURE, AND DRINKING WATER POLICIES (2006), http://www.epa.gov/dced/pdf/growing_water_use_efficiency.pdf; U.S. ENVTL. PROT. AGENCY, PROTECTING WATER RESOURCES WITH HIGHER DENSITY DEVELOPMENT (2006), http://www.epa.gov/dced/pdf/protect_water_higher_density.pdf; U.S. ENVTL. PROTECTION AGENCY, OUTDOOR WATER USE IN THE UNITED STATES (2008), http://www.epa.gov/watersense/docs/ws_outdoor508.pdf.

230. Kanouse & Wallace, *supra* note 45, at 156–60.

231. *Id.* (imposing measures in residences and in food service, hospitality, and health care sectors).

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- creating or reconfiguring flood corridors;²³²
- increasing water infrastructure capacity;²³³
- increasing the efficiency of agricultural and urban water use;
- expanding the distribution and reuse of wastewater;
- creating new storage, both above and below ground, to store water in times of surplus and to diversify sources of supply;
- improving integration of both flood and water management through the development of surface and groundwater conjunctive use strategies;
- implementing local stormwater management programs;
- building facilities to reclaim or desalt otherwise poor quality sources of water; and
- making land use decisions that minimize new water demand, protect water quality, and promote recharge of groundwater.²³⁴

While these strategies focus largely on steps that local governments can take directly within their communities, the greater reality is that local governments will often need to coordinate across jurisdictional divides to effectively achieve their goals and priorities.

6. *Horizontal and Vertical Coordination*

Watersheds and aquifers rarely fall exclusively within one jurisdiction, which means that meaningful water planning requires horizontal coordination among geographic jurisdictions. “Both rapidly growing urban areas and smaller communities in watersheds of origin” are affected by land use, climate, and water decision making.²³⁵ Coordination should address not only the amount of water supply available within a watershed, but also the quality of that water, since the land uses that consume water and create discharges in one

232. Andrew et al., *supra* note 43, at 1469–70.

233. *Id.* at 1471.

234. *Id.* at 1471–72; *see also* Salkin, *supra* note 90, at 163 (discussing water conservation and improved stormwater management in the West).

235. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 165.

community can directly affect a shared source and hence injure another community. Vertical coordination is likewise necessary to bring all the decision making authorities together on a question. Because many actions will require coordination with other government entities or private parties, implementation agreements should also be expressly authorized in the enabling legislation.²³⁶

A coordination requirement is consistent with APA Smart Growth Guidebook recommendations, which call for joint governmental planning over shared natural resources.²³⁷ Joint planning eliminates duplication of effort, reduces chances that different players are working at cross-purposes, and promotes the sharing of expertise, information, and databases.²³⁸ And while a local water-climate element cannot, standing alone, fully achieve integrated watershed governance, it takes an important step in that direction by requiring local governments to prepare for and fully engage in coordination.

Local preparedness reaps a myriad of benefits. In states that already have watershed management efforts, those efforts will be enhanced by local water-climate planning since local governments are integral players in watershed health.²³⁹ Preparedness also gives a voice to communities directly impacted by water rights decisions. Tarlock and others advocate for community-level water governance, so that impacted peoples “have a say in the . . . economic, cultural, environmental and aesthetic resource base.”²⁴⁰ For example,

236. GROWING SMART GUIDEBOOK, *supra* note 143, at 7-259 to -262.

237. *Id.* at 7-142.

238. See Craig, *supra* note 91, at 54 (making similar observations about the importance of coordinated adaptation planning “to reduce redundancies, increase efficiency, and avoid conflicting adaptation measures”).

239. See, e.g., Keith Hirokawa, *Driving Local Governments to Watershed Governance*, 42 ENVTL. L. 157, 161, 200 (2012) (noting that local governments are a “primary positive driver” of collaborative watershed protection); Tarlock, *Local Governments in Watershed Management*, *supra* note 12, at 149 (“[E]ffective watershed conservation will require cooperation and coordination among all levels of government, including local units.”); Andrew et al., *supra* note 43, at 1468 (“To be successful, adaptation strategies must be implemented collaboratively at the state, regional, and local levels, and integrated to maximize their effect.”).

240. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 167, 171; see also Hirokawa, *supra* note 239, at 169 (noting the “codependency between [watershed] ecosystems utility and the character of local communities”); Lucero, *Comments: Connecting Water and Land*, WET GROWTH, *supra* note 17, at 447.

basin-of-origin communities with comprehensive plans that make a compelling case for particular water needs are better positioned to argue against out-of-basin transfers when a state examines whether such transfers are in the “public interest.”²⁴¹ Stronger basin-of-origin advocacy can also result in “demand-side management” as an alternative to water transfers.²⁴²

Beyond the watershed level, regional coordination may also be necessary. Local preparedness is particularly critical to the success of mixed regional-local approaches such as that suggested by Arnold,²⁴³ who recommends planning around different organizing units of nature (from smaller catchments, to mid-level watersheds, to larger basins) and overlaying traditional, local land use powers with binding regional watershed plans.²⁴⁴ Water planners have coined the concept of “integrated regional water management” (IRWM) to describe such approaches:

IRWM is an inclusive approach for determining the appropriate mix of water demand reductions, supply enhancement, and water quality improvement actions, to provide the best long-term balance between the costs of water reliability and quality actions and the benefits of those actions. While IRWM has long been recognized to be important in water management planning, the challenges posed by climate change make it a critical strategy for adoption.

[IRWM] requires a collaborative effort to manage all aspects of water resources in a region. IRWM is distinct

241. Tarlock & Bates, *Growth Management and Western Water Law*, *supra* note 5, at 178–79.

242. *Id.* at 183–84; *see also* Denise Fort & Barry Nelson, *Pipe Dreams*, THE WATER REPORT, Dec. 15, 2012, at 17–23 (advocating for conservation as an alternative to costly water imports).

243. Arnold, *Clean-Water Land Use: Connecting Scale and Function*, *supra* note 13, at 293–94 (advocating for management approaches where land use scale and function are better matched with hydrologic scale and function); *see also* J.B. Ruhl et. al., *supra* note 26, at 929–30, 945–46 (2003).

244. Arnold, *Clean-Water Land Use: Connecting Scale and Function*, *supra* note 13, at 343–50. Arnold also makes a distinction between collaboration as “consensus,” which is an approach subject to criticism, and collaboration as “multi-participant,” which may not produce consensus but does afford meaningful input and the sharing of information and expertise among stakeholders. Arnold, *Adaptive Watershed Planning*, *supra* note 102, at 437–39.

from traditional approaches . . . because it promotes the integration of all facets of water management. This integration considers goals for water supply, wastewater, flood and storm water management, and environmental water needs IRWM transcends jurisdictional, watershed, and political boundaries; involves multiple agencies, stakeholders, individuals, and groups; and attempts to address the unique regional issues and differing perspectives of all parties involved through the development of mutually beneficial solutions.²⁴⁵

Importantly, regional coordination can address community-identified vulnerabilities by increasing water supply options beyond a particular watershed. Regional projects that “pool resources” and “capitalize on the scale economies associated with most new supply technologies” can mean more water availability²⁴⁶ in the right place, at the right time.

Washington offers several examples of coordinated efforts to tackle climate variability, snowpack loss, rapid population growth, exempt well conundrums, competing urban-agricultural demands, and increased pressures to protect endangered species. Two of those examples are highlighted here. The first example, in Tri-Cities, Washington, illustrates the potential for strong horizontal integration, while the second example, from the Yakima River Basin, illustrates how complex vertical and horizontal integration can be achieved.²⁴⁷

Tri-Cities Example. Washington’s Tri-Cities metropolitan area is engaging in regional water conservation planning among multiple local governments.²⁴⁸ The cities of Kennewick, Pasco, Richland, and West Richland, Washington share a

245. Andrew et al., *supra* note 43, at 1470–71. For an example of a model using IRWM, see generally the California-EPA Region 9 Climate Change Handbook for Regional Water Planning, *supra* note 165.

246. Ellen Hanak & Margaret K. Brown, *Linking Housing Growth to Water Supply*, 72 J. AM. PLAN. ASSOC. 154, 161 (2006).

247. These success stories are attributable in part to Washington’s Watershed Planning Act, discussed *supra* Part I.A, which enables and funds coordinated watershed planning throughout the state. See Arnold, *Adaptive Watershed Planning*, *supra* note 102, at 474–75 (discussing studies that document increasing references to climate change in Washington’s watershed plans).

248. 2008 REGIONAL WATER FORECAST AND CONSERVATION PLAN UPDATE (rev. July 2010), http://www.go2kennewick.com/go2kennewick/default.aspx?option=com_docman&task=doc_view&gid=3214 [hereinafter TRI-CITIES PLAN].

common water right from the Columbia River and are jointly implementing protocols to reduce water consumption based on state-imposed conditions to the water right. The Tri-Cities area is predicted to grow by over sixty percent in the next twenty years, and it relies heavily on irrigated farming.²⁴⁹ The region is semiarid, with low annual precipitation, large interseasonal temperature variations, and strong winds that create high evapotranspiration in summer.²⁵⁰ Portions of the area are already experiencing water shortages, and under an ESA Biological Opinion, the cities are also obligated to protect aquatic habitat by preserving instream flows on the Columbia River.²⁵¹ In other words, water-climate planning is critical for the region.

The Tri-Cities' water conservation plan relies on climate data, hydrologic studies, and population forecasts from the communities' comprehensive plans.²⁵² Each city has set its own water efficiency benchmarks, and they have joined forces in regionally addressing leak detection, residential retrofitting, water audits, water curtailment planning for natural disasters, and incentive and educational programs.²⁵³ They also use daily flow tracking to assess when curtailment or the use of mitigation water is needed for the fishery.²⁵⁴ To develop mitigation water, the cities are using a combination of habitat conservation in critical recharge areas, increased water storage during high flow periods, and transfers to the state water trust account.²⁵⁵ Importantly, this regional plan "has allowed the Cities to consolidate a number of components of their individual conservation programs with the primary benefits of sharing and leveraging resources and distribution of one unified conservation message to the public."²⁵⁶

Yakima Example. Another collaborative effort is the Yakima River Basin's Proposed Integrated Water Plan.²⁵⁷ The Yakima

249. *Id.* at 6.

250. *Id.* at 5.

251. *Id.* at 30.

252. *Id.* at 6, tbl. 2-2.

253. *Id.* at 10-11.

254. *Id.* at 34.

255. *Id.* at 35-37.

256. *Id.* at 10.

257. U.S. BUREAU OF RECLAMATION, YAKIMA RIVER BASIN PROPOSED INTEGRATED

Basin is highly sensitive to snowpack. Through climate modeling work done by the University of Washington Climate Action Group, basin water users were able to see that by 2020 the risk of water shortage would double from its current fourteen percent per year.²⁵⁸ Thus, the Confederated Tribes and Bands of the Yakama Nation, the Bureau of Reclamation, the State of Washington, counties and municipalities, major irrigation projects, and conservation organizations in the basin forged an “unusual alliance” that has produced a promising “land-water-climate adaptation project.”²⁵⁹

The Proposed Plan reflects the complexities of water planning in a highly engineered basin with extensive water storage and transfer projects and a mixture of federal, state, tribal, rural, and urban lands. The key elements include fish passage and habitat enhancement, modification of existing project structures and operations, new water storage, market reallocations, groundwater recharge and storage, and enhanced water conservation.²⁶⁰ The plan contemplates additional water supply for municipalities, conditioned on meeting water use efficiency standards that include:

- **Education, incentives,** and other measures to encourage residential and commercial users to improve landscape irrigation efficiency where the source of supply is agricultural irrigation canals or ditches.
- **Improving the efficiency of consumptive uses** (i.e., water that evaporates or is otherwise consumed and does not return to surface streams or groundwater through wastewater treatment plants, septic systems or surface infiltration).
- **Establishing best practice standards** for accessing new water supply developed under the Plan, including the use of municipal/domestic mitigation water to offset increased water usage from new housing

WATER PLAN (April 2011), <http://www.usbr.gov/pn/programs/yrbwep/2011integratedplan/plan/integratedplan.pdf> [hereinafter YAKIMA PROPOSED PLAN]; other related information is located at the Washington Department of Ecology website, <http://www.ecy.wa.gov/programs/wr/cwp/YBIP.html> (last visited June 12, 2013).

258. *Id.*

259. Steve Malloch & Michael Garrity, *Yakima River Basin Integrated Water Plan: Strange Bedfellows Take Risks, Find Common Ground*, THE WATER REPORT, Dec. 15, 2012, at 3–4, 9.

260. *Id.* at 5.

or businesses, particularly when homes are supplied by individual household wells.²⁶¹

In turn, county governments are preparing for implementation of the Proposed Plan through interlocal agreements, watershed protection planning, and land use planning. Kittitas County, which is the location of several “preferred habitat protection and enhancement actions” under the Proposed Plan,²⁶² recently released a study analyzing the economic and planning impacts of changed land use designations that will likely occur in the rural and urban areas of its jurisdiction after the Proposed Plan takes effect.²⁶³

A major impetus of the effort was 2009 federal legislation called the SECURE Water Act,²⁶⁴ which directs the Bureau of Reclamation to study selected river basins and sub-basins in the West, including the Yakima, where water supply is not meeting demand. The Bureau’s studies must include supply-demand projections that factor in population increases and climate change impacts.²⁶⁵ While the Proposed Plan’s ultimate success depends upon several funding and permitting contingencies, participants credit its early success to a convergence of interest among the various stakeholders:

Yakima Plan participants recognize that the existing situation increasingly does not work for any of the Basin’s interests. Agriculture . . . is facing increasingly frequent severe shortages. Fishery restoration . . . is far short of restoration of healthy abundant runs that biologists and recreationalists desire and the Yakama Nation seeks to fulfill its Treaty rights—and climate change puts even these tenuous current conditions at

261. YAKIMA PROPOSED PLAN, *supra* note 257, at 57–58.

262. KITTITAS COUNTY, FINAL ECONOMIC IMPACT COMPENSATION AND POLICY RECOMMENDATIONS ES-1 (Nov. 2012), <http://www.co.kittitas.wa.us/cds/landuse/feicpr/documents/20121129-Final-Report.pdf>; *see also generally* BENTON COUNTY, SHORELINE ANALYSIS REPORT FOR SHORELINES IN BENTON COUNTY: YAKIMA AND COLUMBIA RIVERS 95 (Nov. 2012), <http://www.co.benton.wa.us/docview.aspx?docid=10676>.

263. KITTITAS COUNTY, *supra* note 262, at ES-3 to -6.

264. Title IX, Subtitle F of Omnibus Public Land Management Act of 2009, Pub. L. 111-11, 123 Stat. 991, 997.

265. Reclamation has funded seventeen of these studies thus far, which are available at *Basin Studies*, U.S. BUREAU OF RECLAMATION, <http://www.usbr.gov/WaterSMART/bsp/studies.html> (last visited June 12, 2013).

risk. Basin interests recognize that something has to change.

* * *

We live in an increasingly complicated world, and for the Basin, that means . . . coordinating water supply and land management Almost all of the water in the system is ultimately runoff. How the land is managed will affect the timing, amount, and quality of the runoff.²⁶⁶

These and other successful coordination examples reveal the great potential for advancement if all local governments in the West are compelled to engage in water-climate planning across jurisdictional lines.

7. *A Plan for Marketing*

To the extent that a community's data indicates the need for additional water supply, the water-climate element of its comprehensive plan should discuss the potential for acquiring water through water markets.²⁶⁷ Likewise, communities in a position to market water can build this economic opportunity into their planning. Larry MacDonnell has observed that "[u]ltimately, if local areas want to retain the benefits of the water presently used they will have to develop ways to make some of this water available to others in return for revenues that can be reinvested in the local area."²⁶⁸ While water marketing remains a concept-in-progress for the West,²⁶⁹

266. Malloch & Garrity, *supra* note 259, at 8–9. Although the authors focus principally on federal land management, similar observations hold true for lands within local government jurisdiction. For a point and counter-point argument on this Plan, see Brock Evans et al., *Yakima Water Plan: The Other Side of the Story*, THE WATER REPORT, Feb. 15, 2013, at 20–23 and Steve Malloch & Michael Garrity, *Author's Reply*, THE WATER REPORT, Feb. 15, 2013, at 24.

267. Out-of-basin water transfers, while heavily relied upon by many urban centers in the West, are not advocated as a long-term best practice. Reasons include the disempowerment of basins-of-origin, questionable reliability, and expense, not to mention the high energy consumption associated with water transport over long distances. See e.g. generally Fort & Nelson, *supra* note 242, at 10–25.

268. LAWRENCE J. MACDONNELL, PROTECTING LOCAL ECONOMIES: LEGISLATIVE OPTIONS TO PROTECT RURAL COMMUNITIES IN NORTHEAST WASHINGTON 21 (Nov. 30, 2008), http://www.ecy.wa.gov/programs/wr/wrac/images/pdf/wa_local_econ_web.pdf.

269. For extensive discussion of the topic, along with a survey of state practices, see PEGGY CLIFFORD ET AL., WASHINGTON DEP'T. OF ECOLOGY & WESTWATER RESEARCH, ANALYSIS OF WATER BANKS IN THE WESTERN STATES (July 2004),

examples that address the water-climate-land use connection are emerging, with another notable example from Washington.

Walla Walla Example. Washington has a state Trust Water Program that uses watershed-level banking to facilitate increased water supply in land use-intensive areas,²⁷⁰ and provides expedited agency review for users seeking to change water rights for conservation purposes.²⁷¹ Although the program is now authorized statewide, the Walla Walla River Basin was one of the early program projects.²⁷² The basin, which contains three major river systems, extends from southeastern Washington to northeastern Oregon. The Washington portion spans two counties. As far back as the 1880s, the basin began experiencing water shortages due to low summer flows and irrigation diversions. The state Department of Ecology then began seasonal stream closures and tightened regulations for new withdrawals. In the 1990s, bull trout and steelhead were listed as threatened species under the Endangered Species Act. Population pressures added to this combination of water stressors.²⁷³

Empowered by the Washington Watershed Planning Act,²⁷⁴ the Walla Walla community initiated watershed planning to protect both existing water rights and instream flows. Participants in the watershed planning unit include “local stakeholders representing twenty-nine entities, including the Confederated Tribes of the Umatilla Indian Reservation, Walla Walla and Columbia Counties, City of Walla Walla, Gardena Irrigation District No.13 and other governmental and non-

<https://fortress.wa.gov/ecy/publications/publications/0411011.pdf>.

270. WASH. REV. CODE § 90.92 (2012), *discussed in* PEGGY CLIFFORD, WASHINGTON DEP’T. OF ECOLOGY, WATER BANKING IN WASHINGTON STATE (Nov. 2009), <https://fortress.wa.gov/ecy/publications/publications/0911024.pdf>. Information related to Washington’s water banking program is located at *Water Banking*, WASHINGTON DEP’T OF ECOLOGY, <http://www.ecy.wa.gov/programs/wr/market/waterbank.html> (last visited June 12, 2013).

271. WASH. ADMIN. CODE § 173-152-050(3) (2013).

272. *Projects: Walla Walla Water Exchange*, WASHINGTON WATER TRUST, <http://www.washingtonwatertrust.org/walla-walla-water-exchange> (last visited June 12, 2013) [hereinafter *Projects: Walla Walla Water Exchange*]. Another area experiencing results under the Trust Water Program is the upper Kittitas Basin. *See Yakima River Basin Water Exchanges*, WASH. DEP’T OF ECOLOGY, <http://www.ecy.wa.gov/programs/wr/cro/wtrxchnng.html> (last visited June 12, 2013).

273. *Projects: Walla Walla Water Exchange*, *supra* note 272.

274. *See* discussion *supra* Part I.A.

governmental entities.”²⁷⁵

State regulations require landowners who drill exempt domestic wells in certain high density areas of the basin to mitigate bucket-for-bucket whatever water they withdraw, based on on-site metering.²⁷⁶ To facilitate the mitigation, the state has an authorized banking program that uses landowner payments to acquire, and then retire, senior water rights in the basin.²⁷⁷ The state, in turn, holds the retired water rights in trust to help serve mandatory instream flow standards.²⁷⁸ These instream flows are a critical part of ongoing local, state, tribal, and federal negotiations on the Walla Walla Bi-State Habitat Conservation Plan to help bring the region into compliance with the Endangered Species Act.²⁷⁹

Outside of Washington, places like Kern County, California require that all developments, regardless of size, add water to whatever groundwater banks will be drawn upon to support the developments.²⁸⁰ Oregon’s Deschutes Basin relies on the buying and selling of groundwater mitigation credits to minimize the impact of new developments.²⁸¹ Additionally, commentators identify the lower Arkansas Valley in Colorado and the Metropolitan Water District/Palo Verde Irrigation District in southern California as areas successfully employing rotational pools—where water users use rotation fallowing in exchange for monetary payments to create a pooled water

275. *Walla Walla River Basin (WRIA 32) Rule Amendments*, WASH. DEP’T OF ECOLOGY, <http://www.ecy.wa.gov/programs/wr/instream-flows/wallawallabasin.html> (last visited June 12, 2013) (explaining the program and linking to several key regulatory documents) [hereinafter *WRIA 32 Rule Amendments*].

276. WASH. ADMIN. CODE §§ 173-532-010 to -120 (2012).

277. WASH. DEP’T OF ECOLOGY, NOTICE: NEW RULE AFFECTING GROUND WATER USES FOR RESIDENTIAL DEVELOPMENTS IN THE WALLA WALLA BASIN (Sept. 5, 2007), http://www.ecy.wa.gov/programs/wr/instream-flows/Images/pdfs/rnl_81707.pdf. WASH. ADMIN. CODE §173-532-050 restricts the statutory groundwater exemption. Mitigation is required for outdoor use during the months of May through November. *Id.*

278. *Projects: Walla Walla Water Exchange*, *supra* note 272; see also *WRIA 32 Rule Amendments*, *supra* note 275.

279. For a discussion of the ongoing HCP negotiations and a 2012 Annual Report, see *HCP*, WALLA WALLA WATERSHED MGMT. P’SHIP, <http://www.wallawallawatershed.org/projects/hcp> (last visited June 12, 2013).

280. Discussed in Kanouse & Wallace, *supra* note 45, at 155. This banking program has not been without controversy. See, e.g., Felicity Barringer, *Storing Water for a Dry Day Leads to Suits*, N.Y. TIMES, July 26, 2011, <http://www.nytimes.com/2011/07/27/science/earth/27waterbank.html>.

281. OR. ADMIN. R. 690-521-0100 to -0600 (2013).

supply that can be used elsewhere in the watershed.²⁸²

Additionally, in watersheds that contain local and tribal government jurisdiction, the potential for tribal marketing of aboriginal and reserved rights with senior priority dates can be explored. The Proposed Compact between the Confederated Salish & Kootenai Tribes, the federal government, and the State of Montana, for example, envisions the potential for the Tribes to lease their reserved and aboriginal water rights for off-reservation development, providing great marketing potential to developed areas in western Montana.²⁸³ In particular, the Proposed Compact notes the leasing of tribal water to mitigate depletions from exempt groundwater wells in the Flathead and Clark Fork Basins.²⁸⁴

8. *Regular Updating & Continuous Assessment*

For its final feature, a model water-climate element should take an adaptive planning approach by requiring regular updating. The uncertain and rapidly shifting nature of climate change necessitates planning that is readily adaptable to new data and changes in water supply.

As a general proposition, the APA Growing Smart Guidebook recommends comprehensive plan updates at five year intervals,²⁸⁵ and the water-climate element should be no exception. Under Washington water supply planning laws for utilities, municipal suppliers such as the Tri-Cities must perform a new water balance every six years.²⁸⁶ To the extent existing comprehensive planning legislation envisions a lengthier period between updates, a shorter, more stringent timeline should be specified for the water-climate element.

Additionally, between update years there should be ongoing monitoring and continuous assessment in order to make “mid-course corrections.”²⁸⁷ Craig succinctly and appropriately

282. MACDONNELL, *supra* note 268, at 12.

283. PROPOSED WATER RIGHTS COMPACT ENTERED INTO BY THE CONFEDERATED SALISH & KOOTENAI TRIBES, THE STATE OF MONTANA, AND UNITED STATES OF AMERICA art. IV.B.5–6 (Feb. 13, 2013), <http://www.dnrc.mt.gov/rwrcc/Compacts/CSKT/2013/2013-2-13ProposedCompactfinallinks.pdf>.

284. *Id.* at art. IV.B.7.

285. GROWING SMART GUIDEBOOK, *supra* note 143, at 7-69, 7-232.

286. TRI-CITIES PLAN, *supra* note 248, at 10 (calculating net consumptive use).

287. Lucero, *Comments: Connecting Water and Land*, WET GROWTH, *supra* note 17,

recommends: “monitor and study everything all the time.”²⁸⁸ “Monitoring of ‘the key factors controlling adaptive capacity and resilience’ is especially critical, and changes in monitoring priorities may be necessary.”²⁸⁹ Arnold also advocates “continuous, event-driven modification of the plan and its implementation strategies and methods in response to evolving conditions, data, knowledge, and other feedback . . . [including] changing needs and goals in the watershed.”²⁹⁰ Because local climate models are just being developed, and climate data is marked by a high level of uncertainty, it is critical for communities to engage in this precautionary, “continual reevaluation.”²⁹¹

CONCLUSION

As population growth, threatened water supply, and climate change continue to transform the West, its communities require a common framework within which they can integrate their visions for land development and sustainable water use. While assured supply laws have targeted the most significant water-development issues, they leave us with much work still to be done. Model legislation that requires proactive community water-climate planning within existing local comprehensive planning offers a familiar, proven tool. Such model legislation can draw upon the best guidance and on-the-ground efforts existing today. States can in turn adopt this model legislation, thereby advancing the West in its next, big step down the pathway of water and climate preparedness.

at 448.

288. Craig, *supra* note 91, at 40-41.

289. *Id.* at 42.

290. Arnold, *Adaptive Watershed Management*, *supra* note 102, at 455. Arnold was addressing watershed plans, but similar observations hold true for water-climate planning within a comprehensive land use plan.

291. *Id.* at 460.